ACCOUNT OF THE OPERATIONS OF

THE GREAT TRIGONOMETRICAL SURVEY OF INDIA

VOLUME XV

ELECTRO-TELEGRAPHIC LONGITUDE OPERATIONS

EXECUTED DURING THE YEARS 1885 86, 1887 88, 1889 90 AND 1891 92

AND

THE REVISED RESULTS OF ARCS CONTAINED IN VOLUMES IX AND X

ALSO

THE SIMULTANEOUS REDUCTION AND THE FINAL RESULTS OF THE WHOLE OF THE OPERATIONS.

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PREFACE

The present Volume of the *Account of the Operations of the Great Trigonometrical Survey of India,* brings to a close the description of the Electro Telegraphic Operations for the determination of Differential Longitudes undertaken by this Survey

The account of previous work in this direction will be found in Volumes IX and X of the same series the present volume is chiefly a continuation of these but it is also in part a revision in consequence of some improvements in the methods of computing instrumental corrections, which the reader will find detailed in Part III

The volume is divided into four parts Part I contains six chapters descriptive of the instrumental equipment and electrical apparatus, the method of observing transits, the arrangement of the observatories, the details of the measurement of personal equation an explanation of the computations as arranged in tabular form, and many other similar matters, by a study of which it is hoped that the reader may be placed in a position to follow for himself the observations contained in the book These introductory chapters are to a great extent the same as those of Volumes IX and X only such changes and corrections having been made in them as were required to bring them up to the standard of the most recent practice

Part II contains in tabular form the computations of the arcs measured during the seasons 1885 86, 1887 88, 1889 90 and 1891 92 they are as follows —

In Season 1885-86	*In Season 1887 88*	*In Season 1889 90*	*In Season 1891 92*
Agra–Mooltan	Madras–Bangalore	Agra–Mooltan (revision)	Calcutta–Waltair
Deesa–Mooltan	Bangalore–Nagarkoil	Agra–Kurrachee	Waltair–Jubbulpore
Agra–Amritsar	Madras–Nagarkoil	Agra–Kalianpur	Waltair–Madras
Amritsar–Mooltan	Nagarkoil–Mangalore	Kalianpur–Bombay	Waltair–Bolarum
Mooltan–Kurrachee	Madras–Mangalore	Jubbulpore–Kalianpur	Bolarum–Bombay (revision)
Peshawar–Mooltan	Bellary–Mangalore	Mooltan–Quetta	Fyzabad–Dehra Dun
Amritsar–Peshawar	Mangalore–Bombay	Kurrachee–Quetta	
Dehra Dun–Amritsar			
Dehra Dun–Agra.			
Experimental arc at Dehra Dun			

The last of the arcs of season 1885 86, in which both transit instruments were placed on the same meridian, and closely contiguous to each other, was undertaken with the view of investigating the causes of certain instrumental errors which are discussed in Part III

Part III contains two chapters explanatory of the reasons which led to certain improvements in the methods of computing instrumental corrections, and describes some experiments which were made on the collimation of the two transit instruments employed These experiments have brought out the interesting fact that the circuit errors which had previously led to much discussion, as well as to some dissatisfaction, were in all probability due to imperfections in the object glasses of the collimators However, a method of calculating the collimation constant so as to eliminate the effect of this imperfection has been adopted, and no uneasiness as to its vitiating the results need be entertained This

part also contains the arcs given in Volumes IX and X recomputed on this method, but only in an abridged form, as it was considered superfluous to reprint all the details of each star observed The reprint contains therefore only the re determination of the collimation and level constants, and the results of each arc in the several pivot positions, with its concluded value.

In Part IV will be found the details of the simultaneous reduction of all the circuits formed by the arcs of longitude measured in India the process of reduction is explained in Chapter I The work is for the most part exhibited in tabular form, and the chapter concludes with a table giving in a synoptical form a list of the finally adopted astronomical values of all the Indian arcs, and a comparison with their geodetic values The two arcs Bombay–Aden and Aden–Suez, though not forming part of any triangular circuit nor entering into the final reduction are of importance as forming two of the connecting links between Greenwich and Kaliānpur and they have consequently been recomputed on the same system The comparison of the geodetic and astronomical values of the arcs as exhibited in this last table is very interesting but this is not the place to enter into any elaborate discussion on the evidence thus given of the necessity of corrections to the accepted elements of the terrestrial spheroid Chapter II of this Part contains a few remarks and rough calculations on the general tendency of the evidence

As the simultaneous reduction is not a work of any great labour, it was intended originally to embrace the whole of Burma and as much as possible of Baluchistan and even Persia in the scheme Unlike the simultaneous reduction of the whole principal triangulation of India, which would have been too vast a work to cope with, and which was consequently divided into five main figures to render it at all manageable, there is no difficulty in combining all the arcs hitherto measured, and many more if necessary into one operation It has been however considered advisable that for a time such purely scientific investigations as those described in this volume should give way to more directly remunerative work and as it seemed uncertain how long they might remain in abeyance it was decided to complete at once the reduction of all such data as were available, rather than postpone it indefinitely until the original scheme had been fully worked out Although the introduction of every additional arc would theoretically have some effect on the final corrections of those included in the present reduction such effect would be insignificant and would scarcely justify any further delay in the computation and publication of the final results

At the end of the Volume are Appendices containing the calculations necessary for deducing the geodetic positions of the stations in Part II at which the observations have been made by means of triangulation laid out for that purpose also a short discussion on armature time, and the velocity of transmission of electric signals along a telegraph wire As one of the chief objects of these measurements of differential longitudes is a rectification of the elements of the terrestrial spheroid by a comparison of the values of the several arcs as determined (1) geodetically, and (2) astronomically it follows that the geodetic positions of the terminal stations of the arcs must be above suspicion A perfectly reliable triangulation connecting these stations with the principal system has been in all cases easily effected and its errors may for all purposes of the longitude operations, be considered rejectaneous

The origin of longitudes for the Indian Survey is the Kalianpur* Hill Station, the value for this being taken at 77° 41 44″ 75 This has long been known to be considerably in error but for reasons which need not here be entered into it has not been deemed advisable to make any change therein as yet It was originally obtained by triangulation from the Madras Observatory, the longitude of the latter place being assumed to be 80° 17 21″

Now that telegraphic communication between Greenwich and Kalianpur is completed, the most direct way of obtaining the longitude of the latter independently of triangulation is as follows —

		°	′	″
Longitude of Mokattam		31	16	33 60†
Increase for Suez		1	16	43 95†
„	Aden	12	25	42 20
„	Bombay	27	50	0 33
„	Kalianpur	4	50	21 75
Longitude of Kalianpur		77	39	21 83

* This is not the Kalianpur Observatory which stands 40 feet further to the west

† These values were supplied by the late Sir G Airy from observations taken in connection with the transit of Venus in 1874.

The value thus obtained is, up to the present time, the most direct and trustworthy, and is not likely to be much improved. It differs, however, considerably from the value adopted in the Indian graticule as given above, partly because the triangulation connecting Madras and Kalianpur was not of very high excellence, but chiefly because the longitude of the Madras Observatory had been determined without the aid of the telegraph, and depended solely on observations of the eclipses of Jupiter's satellites and moon culminating stars—methods which are admittedly far inferior in precision to that afforded by the electric telegraph The longitude of the Madras Observatory has been mixed up with the subject of Indian longitudes in a way which is likely to produce false ideas on this point and it should be borne in mind that it has no more to do with the longitude of Kalianpur the true origin of Indian geodesy, than any other station in India, it was introduced originally by Colonel Everest as being the only place in this country where observations of absolute longitude with regard to Greenwich had been made It would be better that it should be entirely left out of any discussion on this question in future Its longitude, if at any time required, may be deduced as follows —

	°	′	″	
Longitude of Bombay as above	72	49	0	08
Increase for Bolarum	5	42	12	02
,, Madras	1	43	39	23
Longitude of Madras Observatory*	80	14	51	33

All the longitudes above given are observed differences of time (reduced to arc) as deduced by means of the telegraph, they are *quite independent of the elements of the terrestrial spheroid,* but are not cleared from the effects of any local attraction existing at any of the stations of observation

In previous volumes the correction to the original value of longitude of Kalianpur has been assumed as $-2\ 30''$ the investigations of the present volume show it to be $-2\ 22\ 92$ but it would even now be somewhat premature to say definitely that this correction may be taken as final For further information on this subject the reader is referred to Chapters X and XI of Volume II

The whole network of longitude arcs measured and reduced in India, up to the time of publication of this volume, embraces 55 arcs varying in length from 148 miles to 695 miles † connecting 25 stations the differences of longitude ranging between 1 second and 44 minutes The difference of longitude between the most eastern station Moulmein and the most western Quetta is $2^h\ 2^m\ 27\ 61$ corresponding to a distance of about 2055 miles and the difference of latitude between Peshawar the most northern and Nagarkoil the most southern station, is $25°\ 50'$, which corresponds to a distance of about 1815 miles The distribution of the various stations is shown in Plate V at the end of the volume There are two other arcs of inferior importance not shown in the plate which do not form part of the main network *viz* Vizagapatam–Madras and Vizagapatam–Bellary the station at Vizagapatam having been superseded by one at the neighbouring Cantonment of Waltair

Operations for determining differences of longitude, undertaken in the United States and Europe and similar in scope and general principles to those described in this volume, appear to be liable to errors of about the same magnitude The accuracy now attained is such that though not quite equal to that of the latitude observations it is yet quite sufficient to afford valuable evidence as to the trustworthiness of the adopted data for the elements of the earth s figure, and the direction and amount of change that may hereafter have to be made in them

The average correction made to each of the arcs by the simultaneous reduction in Part IV is $0^s\ 017$ $(= 0''\ 26)$ corresponding in Indian latitudes to a distance of about 25 feet The probable error of a determination of latitude is only $0''\ 04$ but it should be remembered in making this comparison that there is no check upon the latitudes, such as is furnished by the circuit equations in the case of the longitudes If the probable error of an arc of longitude be determined from the residuals only as is done in the case of latitude, it is reduced to about 15 feet, it is not claimed

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* The exact point of the Madras Observatory referred to is the centre of the present Meridian Circle which is believed to be 18 feet east and 6 feet north of Colonel Lambton s origin *vide* note attached to page xiv—G of Volume XIII of the *Account of the Operations &c*

† These are the direct distances between the stations; the distances measured along the telegraphic lines which in many cases are somewhat circuitous may be considerably greater The longest line of wire used is between Waltair and Jubbulpore a distance of 1176 miles, for which one intermediate translating relay was found indispensable

that the work is reliable within this narrow limit, but the fact is merely mentioned to show that the test applied to the former is, by reason of the circuit equations, in reality more severe than that applied to the latter The reader will find a discussion on the probable errors and weights of the several arcs in Part IV

It may be advisable here to state, that the elements used throughout the computations of the Great Trigono metrical Survey of India are those commonly known as "Everest's Constants 1st set" and although more recent determinations of their values have been available of late years, it was obviously impossible, as well as undesirable, to revise and correct the whole of the enormous mass of computations, that have accumulated from time to time, in accordance with the more modern values of the elements, more especially as even now they cannot be considered as *finally* settled

If the reader will refer to Volume II, Chapter X, he will find much interesting information on this point The data for a re determination of the earth s figure, since that chapter was written, have been vastly augmented The principal triangulation and its final reduction are now complete and the same is true of all the arcs of longitude measured up to the date of the publication of this volume There remain however still a good many blanks in the scheme drawn up for observation of latitudes, but these are being gradually filled up, and the progress is likely to be more rapid, now that the officers lately employed on longitude observations are available for the former work

The measurements recorded in Part II of this volume were made by Major (now Colonel) G Strahan R E, Major (now Colonel) W J Heaviside, R E, Captain S G Burrard R E, and Lieut G P Lenox Conyngham, R E The various com putations have also been carried out by these officers The descriptive chapters in Part I were written by Captain Burrard, on the basis of the first six Chapters in Volume IX, which were due to Lieut Colonel W M Campbell, R E For the des criptive chapter of Part III and the superintendence of the recomputation of the arcs contained therein and also for Part IV I am solely responsible I am much indebted to Babu Cally Mohun Ghose, whose previous experience in work of this nature was of great value for assistance rendered in the simultaneous reduction and also to Mr Peychers who has passed the work through the press The index chart at the beginning and the plates at the end of the volume were engraved in the Head Quarters Office of the Survey of India Department in Calcutta

I have much gratification in placing on record here my thanks for the ready co operation of the Telegraph De partment in this work It was commenced in 1875 and has been carried on intermittently up to the present time and on no single occasion has there been any friction between the officers of the two departments Ready and willing aid has always been rendered to the Survey Officers by the Director General of Telegraphs and the officers of his department, without which it would have been impossible ever to have secured this valuable collection of data for the furtherance of geodetic investigation

G STRAHAN, COLONEL, R E,

April, 1893

Deputy Surveyor General,

In charge Trigonometrical Surveys

ERRATA ET ADDENDA

PART I

Page					
30	in diagram and *passim*	*for*	Karachi	*read*	Kurrachee
31	lines 4 and 7 from bottom	,,	Part IV		Part III
37	line 3 from top	,,	Part II		Part III

PART II

29	col 6, line 9 from bottom	*for*	33 3 38 97	*read*	3 33 38 97

List of Errata for insertion in Volume IX of the *Account of the Operations of the Great Trigonometrical Survey of India*

ERRATA.

PART I

Page			
7	col 16, line 12 from top	*for* 6 42 61 22	*read* 6 42 16 22
83	, 3, „ 8 bottom	„ + 2 4	+ 2 41
138 139	cols 3 and 8 at top	„ 1875	1876
151	col 16 line 9 from top	, 6 44 53 8	„ 6 44 55 8
154	cols 6 and 7 *transpose* entries in lines 17 and 18 from bottom		
172	col 6, line 10 from bottom	*for* 20 17 09	„ 21 17 09
„	„ 6 „ 9 ,	„ 20 30 32	„ 21 30 32
,	„ 11 10	22 48 89	„ 23 48 89
	„ 11 „ 9 „	„ 23 2 4	„ 24 2 14
210	, 6 , 1 from top	, 10 48 15 67	„ 10 50 15 67
„	„ 11, , 1 „	„ 10 53 58 27	„ 10 55 58 27
211	„ 6, , 11 „	„ 10 50 21 52	, 10 49 21 52
,	„ 11 , 11 ,	, 10 56 4 06	„ 10 55 4 06
„	„ 6, , 13 ,	„ 53 18 69	52 18 69
„	„ 11 „ 13 „	„ 59 1 20	„ 58 1 20
,	„ 6 14 ,	, 53 40 33	„ 52 40 33
„	„ 11 , 14 ,	„ 59 22 82	, 58 22 82
„	, 6 , 15 „	55 16 41	54 16 41
„	„ 11 15 „	„ 11 0 58 93	10 59 58 93
„	„ 11 , 16 „	„ 3 2 00	11 3 2 00
212	6 9 ,	„ 11 0 20 96	, 11 2 20 96
„	, 11 9 „	„ 6 3 44	„ 8 3 44
217	, 6 13 „	, 11 0 4 91	11 1 4 91
„	, 11 „ 13 ,	„ 7 47 49	„ 8 47 49
248	Arc Agra–Deesa, line 6 from bottom	„ $\Delta L_N + 23\ 20\ 380$	„ $\Delta L_N = 23\ 20\ 380$

PART II

(79)	col 4 line 10 from bottom	*for* S	*read* N

List of Errata for insertion in Volume X of the *Account of the Operations of the Great Trigonometrical Survey of India*

ERRATA

PART II

Page							
133	line 13 from bottom		col 11		*for* 23 11 56		*read* 33 11 56
147	„ 11	„	„	„	36 24 63		36 34 63
277	3	„	„	6	„ 42 43 86		„ 42 44 86
„	„	„		8	„ 42 69		„ 43 69
295	„ 11	„	„	11	„ 47 9 61		47 9 16
305	„ 6	„	„	„	„ 41 23 72		„ 42 23 72
408	footnote	*for* W Clock			*read* E Clock	and *for* E Clock	„ W Clock

ELECTRO-TELEGRAPHIC LONGITUDES

PART I

DESCRIPTION OF THE INSTRUMENTAL EQUIPMENT

AND OF

THE OPERATIONS GENERALLY

WITH

DETAILS OF THE SYSTEM OF OBSERVING

AND OF

REDUCING THE OBSERVATIONS

DURING

1885-86, 1887-88, 1889-90 AND 1891-92.

CHAPTER I

DESCRIPTION OF THE INSTRUMENTAL EQUIPMENT

1

Equipment

The Instrumental Equipment was the same with some trifling exceptions as that described in Volume IX of the *Account of the Operations of the Great Trigonometrical Survey of India*, but for the sake of convenience the description as there given is now repeated with the necessary alterations

2

The Transit Telescopes

The Transit Telescopes are by Messrs T Cooke and Sons, of York, sister instruments of nearly identical dimensions they are marked No 1, and No 2 One of these is shown in Plate I in position for the observation of the reflection of the wires in the mercury trough The focal length is slightly over 5 feet, and diameter of object glass the whole of which is effective is 5 inches There are two wire diaphragms, one of which carries a single vertical, and a pair of horizontal wires—about 1 apart—crossing the centre of the field, and the other a set of 25 vertical wires, arranged in groups of 5 each, for the observation of transits The latter diaphragm is worked by a micrometer screw, and the former may be called fixed, although there is provision for adjusting its position as required The twenty five vertical wires were conveniently named *A*, *B*, &c, to *Y*, the central one being *M* their mean distance apart is about 36″ 6=2 44 equatorial seconds, and the groups are separated by double intervals The micrometer head (which is hidden in Plate I by the lamp stand) is comprised of two plates, one graduated to show revolutions, and the other

to indicate divisions, of which there are one hundred in the revolution the two plates are connected by a set of toothed wheels The value of a revolution was found to be almost identical in the two instruments, *viz*, $1^R = 33\ 75$ The micrometer head is protected by a cap, which, being screwed on after setting to a particular reading insures it against being accidentally moved, and there is a small window of talc through which the setting can be inspected lest it should have been disturbed in applying the cap, which is not an unlikely contingency This setting is of great importance, as upon it the collimation of the telescope depends A screw (which is also hidden in Plate I) is provided for moving the eye piece rapidly across the vertical wires during observations, so that the star may be kept close to the centre of the field The set of eye pieces comprises direct eye pieces of various powers, with prisms for oblique use, and a Bohnenberger eye piece, *A*, Plate I, for use with the mercury trough The latter eye piece has been invariably used for all work, including star transits, its shape being convenient for the observation, in a sitting posture, of stars close to the zenith

Two kinds of wire illumination are provided —1*st*, the ordinary dark wires in a bright field and 2*nd*, bright wires in a dark field, the arrangement being as follows —A lamp is placed opposite one end of the transit axis, which is perforated and fitted with a lens, whence that end is designated the "Illuminated Pivot", a term constantly used to define the position of the instrument When observing, a second lamp, though not required, is always placed opposite the other end of the axis to neutralise any effects of heating on the instrumental adjustment, see Plate I In the centre of the axis there is a light plate, revolving on an axis at right angles to both telescopic (optical) and transit axes, (cut out in the centre so as not to interfere with rays from the object glass) and capable of being moved through an angle of 45°, by a rod passing along inside the tube of the telescope with a handle projecting close to the eye piece In the centre of the opening in this plate and therefore at the intersection of the optical and transit axes of the telescope, a small silver reflector is placed at the end of a fine supporting arm When the plate is inclined at 45° to the transit axis, the light from the illuminating lamp is reflected directly on to the wires by this small reflector, and the result is a bright field with dark wires When the plate is turned so that its plane coincides with the transit axis the light of the illuminating lamp is intercepted by a set of four mirrors which are attached to the plate, and reflected towards the eye piece, between the telescope tube and an inner tube provided for the purpose these four sets of rays converge slightly, so as to strike upon four prisms which are attached to the frame carrying the wire diaphragm two on each side of the telescope, slightly above the plane of the wires The latter prisms again reflect the light at right angles so that the rays are brought nearly into the plane of the wires which thus become illuminated by the light from the prisms on each side, the field remaining dark Both kinds of illumination are fairly satisfactory

There are two setting circles, *B B*, attached to the tube of the telescope, one on each side near the eye end each $7\frac{1}{2}$ inches in diameter they are graduated to 20 minutes with verniers reading to 1 minute, and each is provided with a coarse level These circles are not permanently fixed to the telescope tube, but can be turned round and clamped in any position, which admits of a change of adjustment for setting by declinations direct, or by zenith distances, &c, when the instrument is set up for use at a new station There is no provision for clamping the telescope when set

The object glass is fixed in its cell so as to be pinched at three points only, and the cell, instead of being screwed into the telescope tube, has close contact with it only at three equidistant points where it is attached by screws, an arrangement which admits of the object glass (complete in its cell) being put on in three different positions

The frame of the telescope consists of three principal pieces, *viz*, the axis, *C*, the object half, *D*, and the eye half *E* which pack separately for travelling The shape of the axis is a central cube of $9\frac{1}{2}$ inches side supported by conic frusta of $9\frac{3}{4}$ inches axial length and $9\frac{1}{2}$ inches in diameter at their junction with the cube, tapering to 3 inches diameter, and terminated by enlarged cylindrical shoulders, $3\frac{3}{4}$ inches diameter and $2\frac{1}{2}$ inches wide, into which the steel pivots are fixed, the axis having been shrunk on to them The pivots are 1 9 inches diameter, perforated by an opening 0 9 inch diameter, and they project 1 9 inches from the axis shoulders The total length of axis is thus 37 3 inches, while its length from

shoulder to shoulder is 33 5 inches the thickness of the metal is about 0 37 inch throughout the cube and cones which were cast in one piece, the cube being strengthened by internal ribs The conical parts were turned both inside and out to ensure as perfect symmetry as possible. The weight of the axis is about 65 lbs Of the four faces of the cube parallel to the axis one pair are perforated by openings of 3¼ inches diameter, to allow of inter collimator observations while the transit telescope is in position These openings can be closed with caps, *F*, Plate I, and they are crossed by spokes which support the illuminating plate already described In the other pair of faces openings of 6 8 inches diameter are cut for the attachment of the telescope half tubes

The two halves of the telescope are each attached to the axis by 12 powerful steel bolts which pass through a flange at the base of each tube, *G*, *G*, Plate I ¼ inch thick and projecting 0 7 inch, and screw into the metal of the cube Each tube is further steadied by its flange fitting into a sunken annulus cut in the face of the cube The two half tubes are quite plain except that about 1½ inches from the base of each brackets, *H*, *H*, Plate I are cast upon them to support levels which for reasons given in Vol IX have not been used The object half is about 2 feet 8½ inches long from its base to the outer surface of the object glass and weighs (with dew cap but without levels) 32 lbs The dew cap *K* is 6 inches long increasing the length of the object half of the telescope to 3 feet 2½ inches or 3 feet 7¼ inches from the (transit) axis of rotation to the end of the dew cap

The eye half tube is only 1 foot 10¾ inches long from its base to where it is cut off for the attachment by four brass screws of the 'eye end *L* The eye end is composed of two concentric tubes to allow of the focussing adjustment which is performed by two opposing screws acting on a stud *M* it is 6 inches long measured to the plane of the wires 3¾ inches diameter and weighs 6 lbs The weight of the eye half altogether (without levels) is 40 lbs The total weight of the telescope proper is thus 65+32+40=137 lbs

The pivots formerly rested on nearly semi cylindrical bearings *N* of gun metal of the same length and diameter as themselves but cut away in the lower part so that there was contact only on two arcs of about 60 each The under surface of these bearings was spherical, and exactly fitted the upper surface of the beds *P P*, on which they rested and to which they were loosely attached by a bolt passing through a slotted hole, so that the whole formed a universal joint which allowed the bearings to adjust themselves under the weight of the telescope and insured the equal bearing of the pivots throughout their length These were found in practice to be unreliable and were exchanged in 1885 for rigid V shaped bearings of gun metal These new bearings are cast in one piece with their beds *P P* and rest on foundation plates of iron *Q Q* which lastly are placed on the masonry piers *R R* Each foundation plate *Q* rests on three feet, projecting very slightly below its lower surface One pivot bed *P*, has three foot screws by which the level of the transit axis is adjusted and the other *P* has a provision, *S* for the adjustment in azimuth The pivots are protected from dust by well fitting caps *T T* The weight of each pivot bed with foundation plate is about 40 lbs, thus bringing up the total weight of the telescope complete to 137+80=217 lbs

3

Adjusting Telescope and Collimators

Each transit telescope is provided with a small light telescope of 9 or 10 inches focal length, supported by an axis of the same length as that of the large telescope, the object of which is to facilitate the adjustment of the collimators to their proper places before the transit telescope is put in position This small telescope has a level attached so that the bearings of the transit telescope can also be approximately levelled before placing the large telescope upon them

With each transit telescope is a pair of collimators, each having an object glass of 2½ inches diameter and 24 inches focal length One of each pair is furnished with a micrometer in the eye piece

for measuring horizontal displacements, the other rests on circular bearings on which it can be turned round its optical axis A peculiar feature about the collimators is the following arrangement, designed to prevent lateral disturbance owing to change of temperature The instrument is really supported on only two legs under its axis while it is merely steadied by a third leg projecting to one side, and attached to the instrument by a hinge allowing of motion in a horizontal plane Of the two legs under the axis, one rests on its bed in a fixed position, while the other is allowed to move freely in the line of the axis, the foot of the third leg is allowed play on its bed in any direction Thus when a movement of the feet is rendered necessary, by a change of the dimensions of the instrument relatively to its supporting pillar owing to a change of temperature, it is assumed that it will take place in the line of the axis If the instrument rested as usual on three feet equally, the direction of such a movement would altogether depend on the friction between the feet and the pillar The idea is an ingenious one, and the stability of both collimators even under extreme variations of temperature has been found most satisfactory, a result which may fairly be supposed to be due, at all events in part, to this construction

4

The Chronographs

The chronographs were made by Messrs Eichens and Hardy of Paris, the latter taking charge of the electrical arrangements they are exactly alike marked by the makers *A* and *B* and one is shown in perspective in Plate II, to which all the references in the following description apply

The instrument may be said to consist of three parts, all supported by a rectangular foundation plate of iron furnished with three foot screws for levelling —

1st The clock work, **A**, for driving and regulating,

2nd The revolving drum, **B**, carrying the paper on which the record is impressed

3rd The table, and carriage, **C**, carrying the recording pens

The regulator is of a novel construction designed by M Foucault It consists of a pair of governor balls, *D*, *D*, connected by a train of toothed wheels with a small fan revolving on a vertical spindle (at the rate of about 30 revolutions per second) inside a fixed cylinder in the circumference of which little windows are cut for the passage of air An outer cylinder, *E*, with a corresponding set of windows, fits closely over the fixed one, and is connected with the governor balls in such a way by a rod, *F*, *F*, that, as the latter rise owing to an increase of speed, the outer windows come into coincidence with the inner and allow the air to pass through whereby the resistance offered to the fan is increased and the rate of the machine checked The two instruments present a curious difference in the action of this regulator, the cause of which could not be traced by the maker himself In one, *B*, the outer fan cylinder never rests for an instant, but maintains a constant state of oscillation, while in the other, *A*, it preserves one position pretty steadily for a while, and then shifts to another

The governor balls revolve on a vertical spindle which rests on a lower cup bearing just below *Q*—hidden in Plate II by the driving wheels—and works in an upper bearing in the bar, *W*, where a cup with covering cap is provided for oil The bar, *W*, screws on to the upright pillars, *X* *X*

The connection of the governor with the outer fan cylinder is effected by the light rod, *F*, in the following manner —An upright arm, *G* is mounted on pivots, which are hidden in Plate II by the drum of the driving weight, and carries counterpoises—also hidden—which press its upper end towards the governor The upper end is forked, and between the members of the fork the rod *F*, is pivoted Another rod *H*, is similarly pivoted and extends to the upright spindle of the governor, where it carries a round headed adjustable pin, *I*, which works in a collar fitting round the spindle, and attached to the governor balls so that it revolves with them, and moves up or down the spindle according as the balls

rise or fall with the increase or decrease of speed In the middle of H at J there is an adjustable pin which fits into a hole in the end of a yoke, K, thus affording a movable joint at J K is itself pivoted on the fixed frame work, M, at its other end, and affords a tie to the rod, H, of such a nature, that so long as the joint at J does not rise or fall, the arm, G, must maintain a constant position

The outer fan cylinder, E, is hung on a bearing above it—exactly over the vertical spindle of the fan—by an open frame work, attached to which is a small projecting horizontal tongue, L, the position of which is adjustable The rod, F, rests on L and has a small pin which fits loosely in a hole in L, and thus provides a movable joint between the two Now if the governor balls fly out owing to increase of speed the collar with the pin I and consequently also the pin at J, must rise and the upper end of G will be brought forward towards the fan cylinder carrying with it the rod, F, which thus by its action on L causes the cylinder to revolve L can be adjusted until the best position of the windows in the outer cylinder relatively to those in the internal fixed cylinder has been secured

The rod, H, is continued beyond G, and carries at its extremity a counterpoise N, which can be screwed along H—through a small range—and clamped wherever desired, thus affording a means of regulating the rate of the instrument that is to say, its mean rate as distinguished from the uniformity of rate the regulation of which is effected by the governor and fan The mean rate will increase as the position of N is shifted towards the governor, and *vice versâ* for the nearer N is to the pin I the less will be the pressure of the latter upwards against the collar, and therefore the greater must be the rate of revolution of the governor to cause the balls to rise The collar is fixed to the lower end of a cylinder, which fits round the spindle and runs over it on two sets of friction rollers O O, between which the jointed arms Y Y are attached, connecting the cylinder with the balls D, D On the spindle are clamped two stops, P, P, to limit the range of the cylinder—and therefore of the balls and collar and when the instrument is going properly the cylinder must always oscillate between these stops without touching either This condition is ensured by varying the amount of the driving weight which is composed of separate discs of lead, while the consequent rate of revolution is regulated by the counterpoise N

The motion of the governor is communicated to the fan by a chain of toothed wheels as follows —At Q there is an enlarged toothed surface on the spindle which gears on one side with the last driving wheel, R and on the other with a small toothed wheel, S, revolving in a horizontal plane Just below S on the same axis—to which it is firmly but not rigidly connected—is an exact duplicate of S (hidden in Plate II) which runs free of Q owing to its lower level, and gears on the other side with T, a set of teeth on the spindle of the next toothed wheel, U The teeth T are on a lower level than the upper wheel, S Lastly the wheel U gears with a set of teeth on the spindle of the fan the lower bearing of which is at V The object of the duplicate wheel, S, is to save the machinery from a dangerous jar in case of sudden stoppage such as would occur if the cord of the driving weight were to break As has been stated a slight relative movement of the two members of S round their common axis is allowed for, which is regulated by a stiff spring so as to break the jerk

The lower bearing V, of the fan spindle requires careful adjustment which however when once obtained may be looked upon as permanent unless intentionally disturbed It consists of a conical cup bearing with a relieving capstan headed screw under the point of the spindle which can be raised or lowered with reference to V, while the whole bearing can also be raised or lowered and clamped by screw nuts Its position should be such that vertical shake of the spindle is just perceptible to the touch the least jam preventing such shake will stop the instrument instantly When proper adjustment of all the parts has been secured, the great secret to ensure a good rate is oil—plenty of oil on all the bearing surface where there is friction under rapid motion The lower bearings of all the vertical spindles should be plentifully supplied, and as they are all cup shaped the supply remains pretty constant their upper bearings also require occasional touching But the most important point is the contact between the pin, I and its collar, where from its situation the oil will not remain long In nineteen cases out of twenty, when the rate of the instrument decreases, a drop of oil between the pin and the collar is sufficient to set it right again Occasionally the fan makes a screeching noise when the rate will at once fall off this is a sign that a touch of oil is wanted on the *upper* bearing of the fan spindle

When packing the instrument for travelling, the system of arms, *F*, *G*, *H*, are removed in one piece by loosening one of the pivots on which *G* works, the yoke, *K*, and the fan cylinder, *E*, are also taken off The bar, *W*, is then taken off the upright pillars, *X*, *X*, which allows of the removal of the governor in one piece, after which *W* is replaced The driving weight is of course taken off and the cord wound up The whole of the clock work is enclosed when the instrument is at work in a light iron framed cover to keep out dust which is not shown in Plate II It is fitted with a glass roof and glass windows at the sides, which latter draw out and allow the hands to be inserted for putting the clock work together, or taking it to pieces, or for necessary adjustments, and thus the removal of the cover is never necessary The winding arbor, *Z*, protrudes through a hole in the cover to admit of the weight being wound up On the other side—not visible in Plate II—a handle also passes through the cover, and acts by a screw on a clamp fitted round the axis of the wheel, *R* by which the instrument can be stopped When supported on its usual wooden stand without any hole in the ground for the descent of the driving weight, the instrument will go for about 50 minutes but the cord is long enough to admit of continuous motion for about three hours, if the weight is allowed to descend

The drum is $11\frac{3}{4}$ inches wide, 3 feet 1 6 inches in circumference and weighs about 45 lbs Each instrument has three spare drums The paper used is $11\frac{3}{4}$ inches wide and about 3 feet $2\frac{1}{4}$ inches long, it is put on with common paste The direction of revolution is shown by an arrow

The connection of the drum with the driving clock work is carried out as follows —The axis of the last driving wheel *R* which gears with the governor at *Q*, and is therefore directly controlled by it, is prolonged through the protecting cover at α, to an outer bearing which is not seen in Plate II, being hidden by the supports of the drum On α there is an enlarged fixed nut β with teeth along the edge of its vertical surface and there is also a movable nut γ, with similar teeth which can be made to gear with β or not at pleasure by means of a lever (invisible in Plate II) which works on the pin, δ Rigidly attached to γ is a toothed wheel which gears with the teeth round the edge ϵ ϵ, of the drum When β and γ are disconnected by the lever the drum is cut off from the clock work and can be turned as desired by hand The clamp to stop the clock work which was referred to above acts on the axis α

The axis, ζ, of the drum is very strongly attached to the cylindrical portion by an interior diaphragm, and is supported on bearings carried by stout uprights, one of which is seen in Plate II at η The other end of the axis, ζ terminates in a toothed wheel (invisible in Plate II) exactly similar to the toothed wheel θ, with which it is connected by a third similar wheel, κ so that the drum and θ revolve in the same period The wheel, κ can be drawn out on its axis to disconnect θ at pleasure from the drum θ is fixed on the end of a long screw spindle which runs through the table, λ, λ, and is seen projecting at μ

The carriage, C rests on the table λ λ and is furnished with a clip projecting downwards and grasping the screw spindle μ so that as θ and μ revolve the carriage travels along the table from left to right The clip can be released by the handle ν when the carriage may be moved by hand and placed where desired The carriage rests on three wheels π ρ ρ and is steadied by three others acting upwards against the sloped under surfaces of the table λ, only one of the latter is visible at σ, the other two being behind the table Of these wheels the position of π only is adjustable, its axis being carried by an arm with a hinge at one end and a raising or lowering screw at the other, by means of which π can be pressed down with more or less force against the table Such pressure should be employed as to bring the lower wheels σ into close contact with the table so that there may be no perceptible shake of the carriage when tested by hand All these wheels have adjustable bearings for their own axes, and if ever the carriage is taken to pieces for cleaning it is particularly necessary to put it together again carefully without changing the position of similar pieces or a proper fit will not be obtained

The carriage bears the recording apparatus shewn in Plate II A slab of wood, *a*, is attached to the metal plate *b*, and is connected with the carriage by hinges at *c*, *c* A screw (invisible in Plate II) below *a* provides a raising or lowering adjustment to regulate the pressure of the pens on the paper On *a* are mounted two pairs of electro magnets, *d* *d* and *e* *e*, with adjustments for changing their position, and each pair has an armature *f*, *f*, carried by arms *g* *g* the ranges of which are regulated by suitable screw studs on the upright bar, *h* A spring acts against each armature pressing it away from the core

of its magnet The armature arms are pivoted on an upright arm similar to *h*, which cannot be seen in Plate II, being hidden by the coils, *d*, *d*, beyond which they extend over the drum, carrying the two pens, *i*, *j*, at their extremities The arms are jointed, and have other means for adjusting the pens as desired The pens themselves are specially made for chronographic recorders, so as to carry a large supply of ink

From the ends of the coils of each electro magnet two silk covered spiral wires, *k*, *k*, *k*, *k*, are carried down to binding screws on the stand of the chronograph at *l*, whence other wires, *m*, *m*, *n*, *n*, are led away to the batteries, &c , so that one pair, *m m*, completes the clock circuit, and the other, *n n*, that in which the observer's key is placed The effect of a signal by break of either circuit is therefore to demagnetize the coils in that circuit and release the armature, which is then jerked away by the spring provided for that purpose, causing the pen to make an outward jerk *i e*, away from the other pen

The pens can be adjusted to trace parallel lines as near together as desired, or actually coincident—the latter being generally the best—the signal jerks being made outwards, but they cannot follow each other at a much less distance than half an inch representing about $1\frac{1}{2}$ seconds of time This difference is called the "Pen Equation", and is always applied as a correction in the reductions

5

The Electrical Arrangements of the Chronographs

The Electrical Apparatus is collected on a board called the "Commutator board", and consists of (1) a commutator by means of which the various changes in the connections are made as required from time to time, (2) a translating relay which is used for the transmission of clock or other signals through the line to the far station, (3) a receiving relay required for receiving the signals from the distant station and passing them on to the chronograph if for record thereon, or to the sounder if for conversation (4) a tell tale relay required to inform the observer whether his signals are passing to line or not, (5) a talking key, and (6) a sounder for purposes of conversation and conventional signals in connection with the work The commutator board is conveniently placed close alongside of the chronograph on the same stand, and the local batteries are arranged on shelves below it The exact way in which these instruments are used will be more fully explained in Chapter III

CHAPTER II

OBSERVATORY ARRANGEMENTS AND PREPARATIONS FOR OBSERVING AT A STATION

1

Observatory Accommodation

The observers always carry about with them portable observatories, consisting of canvas roof and walls on a wooden frame work with shutters and curtains to admit of a meridional aperture from the ground upwards These observatories are sufficiently large to hold the transit telescope only the chronograph, clock, &c, are otherwise provided for by building proper shelter, if suitable accommodation in existing buildings is not available as it generally is A small room of about 8 $\times$ 10 feet is all that is absolutely required for this purpose, though more space is convenient This room should be as close as possible to the observatory tent—say within 10 yards—because the observer is constantly called on to visit one from the other For the protection of the clock from changes of temperature the shelter should be as substantial as may be

2

Buildings for Instruments

The necessary preparations for observing at a station—assuming the existence of a clock room—are confined to building pillars for the transit telescope and its collimators, and one for the clock to be hung against when it is not convenient to hang it against a wall of the room The pillars are founded 2 or 3 feet below the ground level, according to the nature of the soil, and the excavations for the foundations are made slightly larger in plan than necessary, so that when the pillars are built there is no contact above their base, and insulation from ordinary tremors is ensured The vacant space thus left round the pillars is afterwards filled in with dry sand

3.

The Transit Pillars and Observatory Fittings

The transit pillars (Plate I) are about 24 × 18 inches in horizontal section from their base to about 3 feet 2 inches above the ground, above which they are only $13\frac{1}{2} \times 13\frac{1}{2}$ inches, the inner face being all in one plane, thus leaving a ledge round the other three sides the small upper portion is about 2 feet high, making the total height of these pillars 5 feet 2 inches They are 2 feet 4 inches apart, and are always built of brick, and capped with slabs of stone which are carried about with the apparatus the foundation plates of the instrument rest on the upper surface of these slabs, which is polished so as to allow the plates to be moved about in making the first rough adjustments After these adjustments have been approximately secured, it has been found advisable to put a disc of paper soaked in beeswax under each foot of the bed plates, to prevent accidental movement on the smooth surface of the stone When the soil is yielding it may be advisable to base both pillars on one foundation, so as to distribute the pressure, but on firm soil the pillars may more conveniently be quite disconnected The foundation pits are always connected by a narrower excavation about 18 inches deep, which contains an insulating layer of dry sand of at least a foot in depth, on which the mercury trough is placed in position for observation The trough requires to be carefully covered to keep out sand and dust, and is further protected by a wooden platform—on which the observer's feet rest when observing zenith stars—with an aperture over the trough which can be opened or closed at pleasure Even with the greatest care to protect the mercury frequent filterings are necessary which however is not of much consequence, as the operation is always performed by native assistants who seem to take considerable pleasure in it

A pair of perforated iron staples are built into the masonry of the upper, or smaller, portion of each transit pillar, on each of its north and south faces, for the purpose of supporting upright iron bars passed through the perforations, which are left just clear of the brick work These bars rise about 3 feet above the pillars, and carry a moveable table to support the lamp which illuminates the Bohnenberger eye piece when mercury observations are being taken, (Plate I) Only one pair of upright rods, one on each pillar, is necessary at the same time—or indeed at any time—but it is a convenience for the observer always to have the instrument in the same relative position to himself when making mercury observations to ensure which he, and therefore the lamp and its supports, must change positions from the north to the south side of the instrument, or *vice versa* when the latter is reversed on its bearings Similar staples let into the outer (east and west) faces of the pillars support stands for the axis lamps, both of which should always be kept in position during observation to cancel as far as possible any effects of unequal heating

The equipment of the observatory tent is completed with a set of steps on which the observer stands for mercury observations, (Plate I), two or three stools on which he sits while taking transits, and a light wooden frame, by means of which four men can lift and reverse the telescope on its bearings whenever desired with the greatest ease, and generally with hardly appreciable disturbance of azimuthal adjustment A table and chair for an observatory assistant, who acts as recorder, are also provided

4.

The Collimator Pillars

The collimator pillars are about 30 × 18 inches in plan, founded generally from 2 to 3 feet below the ground surface, and insulated as in the case of the transit pillars Their height is such as to bring the axes of the collimators and that of the transit telescope as nearly as possible into the same horizontal plane. They are built about 3 inches to the west of the meridian of the transit telescope and generally about 15 feet distant from it. This interval of 3 inches from the meridian is

introduced, in order that the steadying foot of the collimator may not fall inconveniently near the edge of the pillar Light and easily moveable frames are provided to cover the collimators and protect them from the weather

5

The Clock Pillar

The clock pillar is founded and insulated like the others The lower portion is generally about 36 × 24 inches up to within a few inches of the ground level where it is decreased to 24 × 24, leaving a ledge 12 inches wide in front and carried up at these dimensions for about 6 feet 8 inches The ledge is convenient for supporting the clock when about to be bolted to blocks of wood which are built into the pillar for the purpose It is very important that this pillar should have weight or rigidity sufficient to withstand the oscillation of the pendulum without vibration, which would have an immediate effect on the clock rate

All the pillars should if possible be built some little time before they are required to allow for settlement and thorough drying, and great care should always be bestowed on the 'bond' of the brick work

6

Chronograph Stand

A wooden stand is carried about for the chronograph, which also accommodates the commutator board and the batteries for the clock pen, and relay circuits The line battery is generally in the Tele graph Office, but occasionally accommodation for it must be provided, which however gives no trouble as, if convenient, it may be placed outside the building in packing cases

7.

Arrangement of Wires

The most convenient arrangement of the numerous connecting wires required, has been found to be as follows —In the observatory tent where only two wires are necessary, they are brought down through the roof to the outer face of one of the pillars then round the pillar to its inner face, where they are finally fixed leaving sufficient free end for convenient attachment to the observer s key, or tappet, to carry which when not in actual use a small shelf is affixed to the inner face of the pillar Or as is some times more convenient, only one wire need be introduced through the roof in this way, while the other may be led back under the surface of the ground as shewn in Plate I In this case neither wire need necessarily be covered, except the ends of one just inside the observatory and clock room, and this plan therefore is a good one in case of economy of covered wire being advisable In the clock room all wires—including those to the clock, to the observatory, to line and to earth—are carried over head and collected in one bundle before they are brought down to the commutator board through a convenient hole, in which they are first passed as a bundle and then separated and brought up to their respective binding screws Should the line wire be brought directly into the clock room the necessity of having a lightning discharger must not be overlooked, and in this case an efficient earth plate must also be provided When the observatory is close to the Telegraph Office, the line wire and earth connections can be made through the office commutator, and neither earth plate nor lightning discharger is specially required As a rule

it is most convenient to make all local, *i e*, observatory and clock room circuits of metal throughout, avoiding the necessity of an earth plate for them

8.

Batteries

The "Menotti" battery, which is the form adopted by the Indian Telegraph Department is used for all purposes, and has the advantages of great constancy while it is easily kept in order It is not so compact or portable as some other forms but this is of small consequence in India, as it can be obtained by giving a few days notice at any Telegraph Office, and need not therefore be included in the portable equipment The number of cells required for local purposes in each observatory may be put at about sixteen A special line battery is only required when the observatory is some distance from the Telegraph Office which can generally be avoided and its strength depends on the length and condition of the line in use Ten cells are considered sufficient for every hundred miles between the stations

CHAPTER III

SYSTEM OF WORKING DURING SEASONS 1885 86 1887 88 1889 90 AND 1891 92 AND THE PROGRAMME OF OPERATIONS

1

The System on which the Observations were taken

There are various ways in which an equipment, such as that described in the preceding pages, may be employed in obtaining the difference of longitude of two stations connected by a telegraph line —(1) Each clock may graduate the chronograph at its own station, and the observers (first one and then the other) may, by means of their tappets, send a number of signals at arbitrary times to be recorded on both chronographs The differences of the two clocks are thereby known, and if the error of each is determined by the corresponding observer by local transits, the true difference of time and therefore of longitude is obtained (2) The observations of transits at one station (each alternately) may be transmitted through the line, so that those taken at both stations are recorded on the same chronograph in terms of the same clock (3) The signals of one clock (each alternately) may be transmitted, so that a record of the same clock time is obtained on both chronographs, while at the same time transits are recorded locally at each station, and (4) At both stations (each alternately) the two clocks may be made to work the two pens, thereby giving what is called a "Direct Comparison of Clocks", their errors being determined before or after the comparison by local transits (or preferably both before and after), the difference of longitude follows at once Of these methods the third has been employed on all arcs contained in this volume The alternation of the clocks is necessary to eliminate the quantity represented by ρ which is the retardation of the electric current along the line wire and through the relays The elimination is only complete when the retardation of the current is the same in both directions

2.

Programme of Each Night's Work

The programme was always laid out by sidereal time, so that the same stars were observed night after night, a point of considerable importance both as regards convenience in the observatory and advantage in reducing the work, especially with reference to clock rates Six complete nights' work has been usually considered sufficient, though this number has been often exceeded according to the observers' opinion of the trustworthiness of their work Reversal of pivots has been always adhered to on systems, which differed at different times and which will be described in detail in the separate accounts of each season's work Two pairs of circumpolar stars for determining the deviation of the telescopes were included in each night's programme and always observed when possible

3

The Electrical Arrangements of the Observatories

The electrical arrangements for securing the chronographic record and communicating between the stations, are as follows —Each pen magnet is placed in a short circuit, with a weak battery, which can be connected at pleasure by means of the commutator, (1) with the clock, (2) with the observer's tappet, and (3) with the armature circuit of the receiving relay which is in connection with the line wire In the first case the pen records the local time and is called the "Clock Pen", in the second it is used for transits or other observations and is known as the "Observer's Pen", and in the third it records any signals transmitted from the distant station and repeated by the receiving relay In the last case the signals are generally those of the distant clock used either for the comparison of clocks or for the observation of transits A second relay is employed for the transmission of signals through the line by "translation", *i e*, the relay coils are placed with a weak battery in a local circuit, into which the clock, or the observer's tappet, can be introduced as required by means of the commutator, and the armature of the relay is in circuit with the line battery and line and thus passes on the signals to the distant station

4.

Retardation of Signals

It is thus evident that the retardation of a signal, passing, say, from one clock to the distant chronograph, is composed of three parts —(1) due to the translating relay, (2) due to the line, and (3) due to the receiving relay, including the pen action, at the distant station A similar return signal is affected in the same way by different retardations but of like nature because the two translating relays are of the same pattern and similarly adjusted, while the same is true of the receiving relays and of the pen actions The line wire of course remains the same in both cases, but unfortunately there are no means of determining whether the rate of signal remains constant in both directions, or whether it is affected by the induced currents from neighbouring wires, which are frequently found to interfere with the clock signals

5

The Pen Equation

A point in the management of the chronograph which requires attention, is the distance between the pens in the line of their (apparent) motion, which cannot be conveniently made much less than half an inch, or about the equivalent of 1 5 seconds of time This difference is called the "Pen Equation," and it has always been deduced and applied as a correction to the readings To guard against errors in the assumed value of the equation, a systematic change of pen duties has always been observed for instance, in the middle of every set of transits the clock and observer's pens are changed, so that for one half of the observations the equation is positive, while for the other half it is negative and similarly when comparing clocks the pens are exchanged between the local and distant clocks during each comparison The value of the pen equation is determined each night by actual measurement of the distance between the corresponding seconds on the chronograph sheets, when both pens are actuated at the same time by one and the same clock

It is necessary to bear in mind that the actual pen equation is the absolute linear distance between the pens and as this has to be converted into seconds of time before being applied as a correction to the observations, the conversion must therefore be dependent on the rate of the chronograph Hence, when transcribing the chronographic record, that rate must be carefully watched with a view to applying a special correction to the pen equation, in cases where the variations of the rate exceed certain limits

6

The Commutator Board

A simple outline plan of the commutator board is given in Plate III on a scale of about one third real size, while symbols for the clock, idiometer, observer's tappet, chronograph recording pens and the several batteries, &c , are added, in order that the various wire circuits may be traced On the commutator board, *C*, *C*, is the commutator itself, *R R* the translating relay, *S*, *S*, the sounder, *D*, *D*, the talking key, and *E*, *E*, a bar which is used as an "earth' , *F* is the receiving relay, and *G* a tell tale relay which is so arranged as to cause the sounder to work while the clock beats are being sent to the distant station, a stoppage of the transmission of the signals being thus at once notified by the cessation of the sounder's action Permanent wire connections between the different instruments on the board are shown by double lines, and those wires which are only temporarily attached at each station are indicated by single lines

The commutator, *C*, *C*, and the switches, *M*, *N* are each composed of plates of brass which are mounted on blocks of ebonite so as to be perfectly insulated from each other the separate plates are shaded The circular indentations, with numbers for reference, indicate holes between the plates which can be filled at pleasure by the insertion of pegs, so as to bring two plates into connection The letters on the several plates indicate the parts of the apparatus with which they are connected, either permanently, or by wires attached temporarily to binding screws provided for the purpose, all of which can be traced in Plate III Thus the plates marked A_c, B_c, and R_c are connected by wires to the copper poles of the batteries for *A* and *B* pens and the translating relay respectively, while A_z, B_z, and R_z are similarly connected with the zinc poles of these batteries *K* is connected with a wire which passing through the break circuit apparatus of the clock is carried to the earth *E*, *E* *I* is similarly connected with the star frame of the idiometer, while a second wire attached to the wire frame of the same instrument is carried to the earth *O* is intended for the observer's tappet—or signalling key—and can be

connected with the one used at the transit telescope, or at the idiometer, as required, by means of the switch, N The line wire is attached to L The plates similarly lettered, *viz*, three marked B_z and two marked A_z, are connected by bars passing underneath the ebonite mounting The plate marked B_C which is inconveniently placed for the attachment of a temporary wire, is permanently connected to the binding screw marked B_C The two plates without any marks are simply dummies through which other plates can be connected The long plate marked E' is connected with the earth, E, E, and the latter is furnished with a number of binding screws for attaching several wires The latter plate is called the 'earth' because it is introduced as a convenient means of completing the commutator local circuits which are all purely metallic For the purpose of line signalling a real earth plate is required, and E, E is connected therewith as shown

The following are the ordinary combinations effected by the commutator in the course of observations, the connections of which can be readily traced by reference to Plate III The pegs used for completing the various circuits are numbered consecutively throughout the commutator and the switches M, N

No I	The clock recording time by pen A,	Pegs 6, 4, 8
	,, ,, ,, B,	,, 2, 10
,, II	Determination of pen equation, clock time being recorded simultaneously by both pens on the chronograph,	Pegs 2, 14, 8
,, III	Observation of transits with local clock—	
	Observer, pen A clock, pen B,	Pegs 25, 20, 17, 8 2, 10
	,, B ,, A,	,, 25, 15, 10 6, 4, 8
,, IV	Observation with the idiometer—	
	Observer, pen A clock, pen B,	Pegs 26, 20, 17, 8 2, 10
	,, B ,, A,	,, 26, 15, 10 6, 4, 8
,, V	Clock comparisons both clocks recording time on the chronograph—	
	Local clock, pen A distant clock, pen B,	Pegs 6, 4, 8 23, 22 19, 10
	,, B ,, A,	,, 2, 10 23, 22, 18, 8
,, VI	Transmitting clock signals for use at the distant station,	Pegs 1, 9
,, VII	Observing transits and transmitting clock signals to distant station—	
	Observer, pen A clock, pen B,	Pegs 25 20, 17, 8 1, 12, 10
	,, B ,, A,	,, 25, 15, 10 1, 13, 8
,, VIII	Observing transits with clock time received from the distant station—	
	Observer, pen A distant clock, pen B,	Pegs 25, 20, 17, 8 23, 22, 19, 10
	,, B ,, A,	,, 25, 15, 10 23, 22, 18, 8
,, IX	For talking or interchanging conventional signals,	Pegs 23, 24

It will be noticed that in all of the combinations given above the different circuits combined are brought into one simple circuit, so that a break of circuit at any point entirely stops the current in the whole There is no branching of circuits, which should always be carefully avoided

The commutator affords the means of measuring the retardation due to the local instruments, by causing the clock time to be simultaneously recorded on the chronograph by both pens, one worked by

the clock direct and the other through the translating tell tale and receiving relays, which is done thus —

A pen direct	*B* pen through relays,	Pegs 1, 13, 8 23, 22, 19, 10
B ,,	*A* ,,	,, 1, 12, 10 23, 22, 18, 8

If the retardations of the receiving relays and of the chronograph pens could be looked upon as respectively equal at the two stations, it is evident that the above experiment would give an exact measurement of the retardation of a transmitted signal recorded on the distant chronograph, only excepting the retardation of the line wire Unfortunately such equality cannot safely be reckoned upon, but the experiment should prove a useful guide in testing the condition of the adjustments of the local relays

7.

Relations with the Officers of the Telegraph Department

Throughout the operations all the Officers of the Telegraph Department whose co operation has in any way been required, have continually shown the greatest courtesy and readiness to give every assistance in their power In many instances the prosecution of the longitude observations has unavoidably caused considerable trouble in the several Telegraph Offices involved, but this has invariably been cheerfully undertaken, and the relations of the officers of the two departments have always been most cordial

8.

Arcs measured during Seasons 1885 86, 1887 88, 1889 90 and 1891 92

Diagrams illustrating the arcs measured each season will be found in the detailed account of the operations of each season It may be remarked here in passing that the system hitherto in force of so selecting the stations for longitude observations as to form triangular circuits, has been adhered to as being the only really reliable means of gauging the accuracy of the results

9.

Reduction of the Observations

An abstract of the observations and the reduction of the results are given for each season separately in tabular form Full explanation of these tables and of the methods employed in carrying out the reductions contained therein will be found in Chapter V All these reductions were made under the superintendence of Colonels G Strahan and W J Heaviside, Captain S G Burrard and Lieutenant G P Lenox Conyngham

The object held in view in drawing up the tables, was to afford all the data necessary for any reader who might wish to examine the reductions and reproduce the results arrived at

The geodetic elements of the several stations of observation are given in the Appendix, at the end of the volume and in the case of stations connected with the Principal Triangulation of the Great Trigonometrical Survey of India by special minor triangulation, an abstract of the latter is furnished

CHAPTER IV

PERSONAL EQUATION

1.

Method of Determination

The relative personal equation of the observers has always been determined by the observation of 'divided transits', in which both observers use the same telescope, one taking the transit of a star over the first ten wires and the other completing the observation of the same star over the last ten wires, whence by reduction to the central wire, a value of personal equation is at once obtained This method repeated with numerous stars—the observers alternating their order of observation—affords an excellent value of their relative personal equation It has long been known that the value of personal equation may be influenced by very slight causes, prominent among which may be reckoned the direction of a star s motion across the field, whether from left to right or right to left, and its apparent velocity Two distinct equations have consequently been recognized in these observations If an observer using a diagonal eye piece seats himself at a telescope with his face to the north, stars will cross the field of view apparently from right to left, if on the other hand he places himself facing south, stars will cross apparently from left to right and in general with faster motion (owing to their lower declination) than in the former case The term 'aspect' is used in this volume to indicate the direction of the observer s face and therefore of the star s motion, but it does not necessarily agree always with the position of the star with reference to the zenith, because a star very near the zenith may be observed equally conveniently under either aspect In determining the personal equation therefore an approximately equal number of stars were observed under both aspects, and two separate equations obtained to be applied to transits of stars of N and S aspect respectively

2

Consequent Precautions

In consequence of this twofold equation, it is evident that each star should be observed at both stations under the same aspect, and in the case of stations differing but little in latitude no difficulty

arises, but if the difference of latitude is great, a star which is considerably south of the zenith at one station may be considerably north at the other It becomes necessary therefore to avoid using any stars within certain limits of declination, whenever the latitudes of the two stations of observation differ by more than 3° or 4°, for supposing the stations to be $m°$ apart in latitude, and $n°$ to be the limit (which may be considered as about 2°) within which each observer can conveniently observe a star with a false aspect—*i e*, as north when it is really south of the zenith, and *vice versâ*—there will be a zone of $m°-2n°$ of declination within which no stars can be used

3

Employment of the Idiometer

A full description of this instrument, designed by Lieut Colonel W M Campbell, for the purpose of measuring the absolute personal equation of an observer, will be found in Volume IX, Chapter V, Section 9 It was supposed that its employment would act as a check on abnormal variations of personality, and that the results deduced by it might be incorporated with those obtained by the usual method of divided transits This expectation was not fulfilled, great discrepancies were found to exist between the two systems and the idiometer has not been used during the four seasons under review

4.

Personal Equation in transcribing the Chronographic Records

The chronographic record is transcribed—that is converted into a numerical record—with the aid of a glass scale of diverging lines, by which the position of a star's transit signal between two second signals of the clock can be measured in tenths of a second, while hundredths may be readily estimated by eye It is evident that there is some room for the effect of a personal equation in this operation, which was guarded against throughout the measurements contained in this volume by the records of both stations being always transcribed by the same person, so as to eliminate any constant equation of reading

5.

Final Remarks

The remarks in this and the preceding chapters apply to the operations of each of the four seasons contained in this volume As the work proceeded, small changes in matters of detail suggested themselves, and to render these clear it will be more convenient to the reader from this point to give a separate account of the work of each season, showing how the experience of each contributed to improvements in the following one

CHAPTER V

DETAILED DESCRIPTION OF THE METHODS OF OBSERVING AND OF REDUCING THE RESULTS, WITH FULL EXPLANATION OF THE TABLES

1

Instrumental Constants

Wire Intervals The whole system of transit wires—twenty five in number—is attached to the micrometer slide by means of which the central wire of the system can be placed in a position of no collimation error or as is generally more convenient in a position for which that error has been determined The usual practice was to observe the transit of each star over the fifteen central wires but it was a very common occurrence to miss one or more wires and the custom was frequently varied purposely for instance when it was desirable to observe two stars of nearly the same right ascension the first fifteen of the twenty five wires were used for the first and the last fifteen for the second star The combination of these circumstances, *viz* the readily adjustable collimation error of the central wire and the frequent variation in the groups of wires over which transits were observed led to the system of reducing the observation on each wire to the central wire in preference to using the mean of the wires For this purpose the equatorial intervals between each wire and the central wire must be known with accuracy, these were carefully determined in seconds from observations of transits of slow moving stars These equatorial intervals being known the computation of time intervals for every star observed and the reduction thereby of the observations to the central wire, can be rapidly effected This method has the great advantage of showing at a glance the accordance of individual wire observations in each transit and leads to the detection of mistakes—such as observations of wrong stars or mis readings of the chronographic record—at an early stage of the reductions The stability of the wire intervals was found to be satisfactory

Telescope Micrometer The determination of collimation and level errors being made by means of the telescope micrometer the value of its screw was required and it was considered desirable to ascertain the regularity of the screw thread by testing this value at different parts of its length With this object the micrometer head was first set to zero and the time of transit of a slow moving polar star over any one wire noted, then without moving the telescope the micrometer was set on to 100 and the time of transit over the same wire again noted thence to 200 300 and in succession up to 3,200, a range which embraces a little more than the whole breadth of the wire system

This process was only carried out in the case of Telescope No 2 With Telescope No 1 the value of the screw was determined by measuring with it the wire intervals, the values of which had been previously ascertained from transits of circumpolar stars

Collimator Micrometer Owing to the system adopted for measuring the collimation error of the transit telescope, the value of the screw of the collimator micrometer was required in terms of the telescope micrometer this was readily obtained by directing the transit telescope on the collimator, by measuring the distance between the two vertical wires of the collimator, first by means of its own micrometer, and then by that of the telescope

The foregoing instrumental constants being known, the first operation in actual observations is the determination of the collimation correction for the central wire, which was carried out as described in the next section

2

Determination of Collimation

In all arcs measured previous to the year 1885, the details of which are printed in Volumes IX and X, the collimation of the telescope was tested by reference to a pair of collimators approximately horizontal in the following way One collimator, N, always placed to the north of the transit telescope, was provided with a fixed pair of crossed wires, while the other, S, placed to the south, possessed a similar fixed cross and also two vertical wires moveable by a micrometer The cross of N was always placed as nearly as possible in the meridian and that of S slightly to one side, so that the observer looking through S saw the two crosses separated by a convenient distance, A, which he measured by the micrometer of S Proceeding to the transit telescope he then observed the cross wire of N and S on the central transit wire, obtaining a mean micrometer reading of each The reading of S so found corrected by A converted into terms of the telescope micrometer, was assumed to give the reading of a fictitious point exactly opposite the cross of N collimator and this latter reading being combined with the observed reading of N the mean of the two was taken as the reading of the telescope micrometer when the central transit wire was exactly collimated This last reading was named C_0 No attempt was however made to observe star transits with the micrometer set at C_0, in order to avoid the necessity of a collimation correction, but a convenient round number—called C—was always adopted and generally used throughout the observations at a station The difference between C_0 and C, which difference was called c_1 was taken as the collimation error of the central transit wire

The sign of $C_0 - C$ is always reversed by change of pivots Two determinations of collimation error were generally made every night and the mean of the two adopted for the correction constant for collimation for the night In 1891, however, it was discovered, that owing to the faultiness of the object glasses of both the collimators and the telescope, the reading of S corrected by A did *not* give the reading of a fictitious point exactly opposite the cross of N collimator, and that it was in fact impossible to determine the reading of the telescope micrometer, when the central transit wire was exactly collimated The new plan was introduced of using one value of C_0 throughout an arc and the value adopted was the mean of the several individual determinations taken during that arc, the effect of any error in this adopted value will be cancelled in the mean of observations taken in the two pivot positions of the instrument A mean value of C_0 per arc instead of a different value every night has been employed in the reduction of all the arcs printed in detail in Part II of this volume This change of method in dealing with the collimation constant is most important and necessitated the entire recomputation of all the arcs measured previously in India and printed in Volumes IX and X The subject is however but briefly dealt with here, as in Part III of this volume, the experiments on the object glasses, the reasons

for the adoption of a mean value of C_0, and the results of the recomputation of all previous arcs are given in full detail

3

Diurnal Aberration

The effect of the diurnal aberration on the time of a star's transit was not lost sight of, although for all the arcs measured—or indeed for any ever likely to be measured—that effect is inappreciable when the observations taken at both stations are combined The correction for diurnal aberration is a constant quantity for each station, and as it must, like that for collimation, be multiplied by secant of each star s declination to obtain the correction in time for that star s observed transit the two corrections may be combined The correction used for aberration was $-0\ 0207 \times$ the cosine of the latitude, and this, converted into terms of the micrometer and applied to c_1 gave c, which was used as the correction constant for collimation and aberration combined for each night

4

Determination of Level Error

The dislevelment of the instrument was always obtained by the use of a mercury trough Supposing the telescope to be perfectly levelled, then the central wire if collimated, will exactly coincide with its reflection from the mercury when the telescope is directed towards the nadir, and if the levelling be disturbed by a certain angular quantity, the wire must be moved by the micrometer through a space representing the same angle, in order to regain coincidence with its reflection This coincidence was always observed several times the mean micrometer reading being called M, it is evident that the dislevelment is the difference between M and C_0 (the reading of no collimation error) this difference is called b and is the level correction constant for combination with the constant for each star to correct the time of transit for dislevelment The sign of b is governed by the same considerations which apply to c_1 as already explained As a rule three determinations of dislevelment were made each night, and their mean used to obtain b for all the star observations of the same night, but occasionally the means of the first and second, and of the second and third, were used for the stars observed during the corresponding intervals The mean value of C_0 for the arc was employed, as being the most reasonable determination any error in the value will cause a corresponding error in the dislevelment, but this will have no effect on the value of an arc, resulting from the mean of observations taken in both pivot positions of the instrument, as with *I P E* the level correction constant is $(C_0 - M)$ and with *I P W* it is $(M - C_0)$

An abstract of collimation and level determinations is given in *Table I* for each season, the arrangement of which will be readily followed with the help of the foregoing explanation, while to facilitate reference, a recapitulatory explanation of the symbols employed is given immediately preceding the table

5

Table II—Deduction of Deviation Correction from Star Observations

In order to determine the azimuthal deviation of the transit telescope from the meridian, two pairs of circumpolar stars were always observed when possible one star of each pair being observed at upper culmination, and the other at lower culmination These were so arranged that one pair culminated

near the beginning and the other near the end of the night's work Table II contains the values of deviation corrections deduced from these observations When a star is designated by a number followed by a name, such as Groombridge, the reference is to the Catalogue from which the star was taken The first eight columns require no explanation beyond a remark that the same clock was always used for both stars of a pair, on rare occasions, however, when one of them was observed in the middle of a set of transits which were being recorded with the time transmitted from the distant clock it was more convenient to use that clock for the azimuth star also although its companion star had been observed with the local clock The clock employed is noted by the letter in the column headed "Clock in use", and when both clocks were used for one pair of stars, the observed time by the distant clock is entered in brackets, in column 10, with the corresponding local time below it the latter being deduced by means of the clock comparisons which were always made When both stars of a pair were observed with the distant clock no such conversion is required The quantity A in column 9, is the azimuth constant for each star, equal to $m \sin \zeta \sec \delta$—where ζ is the zenith distance, positive when south and negative when north δ the declination and m a constant numerical factor for converting divisions of the telescope micrometer into seconds of time m will be referred to again This formula gives the sign proper to A under all circumstances, if the declination of a lower culmination be considered the supplement of the actual declination

The Observed Time of Transit", in column 10 is the mean of the times observed on all wires after the reduction of each to the central wire The "Corrections for Collimation and Level', columns 11 and 12, are those obtained by multiplying the corresponding correction constant given in *Table I* by the proper constants for each star *viz* $m \sec\delta$ for collimation and $m \cos\zeta \sec\delta$ for level, the symbols being as above The stars in *Table II* being all well known, it was not thought necessary to enter their declinations but the approximate latitudes of the stations are given in order to facilitate the re computation of the corrections if required The factor m was introduced because the collimation and level corrections were originally obtained in terms of the micrometer and it was more convenient to retain that denomination—and employ it for the deviation correction also—than to convert into seconds directly The values of the telescope micrometers as determined by observation from time to time* varied so slightly that the mean value 1 div = 0 0225 (equatorial) has always been used for both instruments, therefore $m = 0\ 0225$ Column 13 contains the ' Correction for Pen Equation Q required to reduce the observer s record on the chronograph to that made by the clock it was daily obtained by observation as explained in Chapter III, Section 5 The ' Correction for Clock Rate , column 14 is required for the interval between the transits of the two stars forming a pair, it was always applied to the later observation, and the interval was so small that a very accurate knowledge of the rate was not necessary Column 15 headed ' Seconds of Corrected Time of Transit' contains merely the sum of the quantities in the five preceding columns the seconds only being entered The 'Right Ascension", in column 16 was computed from the Nautical Almanac in the case of stars found therein for other stars it was computed by the Quantities for correcting the places of stars' or, previous to 1891 by Airy s Day Numbers In the latter case the term involving the longitude of the moon was not lost sight of but it was never used in the reduction of Right Ascension as its effect on the stars employed was found to be inappreciable When a lower culmination was observed, the computed Right Ascension at the time of observation increased by twelve hours, is entered

The Apparent Clock Corrections , in column 17—being the differences between the two preceding columns—afford the means of computing the deviation correction a_1 as follows —Let ΔT be the true clock correction while Δt and Δt_1 are respectively the corrections obtained by the upper and lower culminating stars of a pair then we have the two equations $\Delta T = \Delta t - A a_1$, and $\Delta T = \Delta t_1 - A_1 a_1$ (where A and A_1 are the values of the azimuth constants for the two stars respectively) by combining which ΔT is eliminated, and there remains one equation from which a_1—expressed in terms of micrometer

* *Vide* page 2 of Part II of this volume

divisions—is deduced, and entered in the next column The sign of a is positive or negative, according as the plane of rotation of the telescope cuts the horizon to the west or east of the north point and thus the quantity Aa affords the correction for deviation to be applied to the time of transit of any star, for which A is computed by the formula given above

During the last arc of the season 1885 86, when both telescopes were at Dehra Dun, advantage was taken of the natural suitability of the place to erect a meridian mark and this latter was used in preference to Star Observations for the determination of the Azimuthal Deviation In 1892 on the Fyzabad–Dehra Dun Arc, when one telescope was at Dehra Dun, the meridian mark was again made use of The northern horizon of Dehra Dun is bounded by a range of hills, which fulfil all the con ditions necessary for the site of a meridian mark Their crest line is some 4000 feet higher than the astronomical observatories in Dehra Dun and never less than 9 miles distant Signals on these hills appear well defined images in a telescope at Dehra Dun adjusted to stellar focus, and any small error in the position of the meridian mark itself can exercise no appreciable effect upon the determi nation of the azimuthal deviation The exact point of the crest line of the hills that is situated on the same meridian as the longitude station of Dehra Dun was determined by Lieut Colonel G Strahan a pillar was built over the spot, a mark stone inserted and a lamp shewn from the latter on nights of observation During the longitude operations every evening before and after work the observer record ed the reading of the micrometer when the meridian lamp was intersected by the centre wire of the telescope these readings were called C_M

The azimuthal deviation from the meridian in divisions of the micrometer screw was then found from the following formulæ* —

$$\text{For } IPE \quad a = (C_0 - C_M) \text{ cosec } 84\ 17 + (C_0 - M) \cot 84^\circ\ 17\,,$$

$$\text{,, } IPW \quad a = (C_M - C_0) \text{ cosec } 84^\circ\ 17 + (M - C_0) \cot 84^\circ\ 17$$

On the four nights that observations were taken in 1886, the readings named C_M and the resultant values of deviation were as follows —

Arc	Station	Date	Telescope No 1 at Southern Station			Telescope No 2 at Northern Station		
				C_M	a		C_M	a
EXPERIMENTAL ARC AT DEHRA DŪN	BOTH TELESCOPES ON THE SAME MERIDIAN	May 5	*IPW*	1614 8 1617 3 1619 9	d + 8 1	*IPW*	2607 1 2604 3 2608 3	d − 6 6
		,, 6	*IPW*	1616 5 1615 5 1614 5	+ 6 0	*IPE*	2606 8 2612 4	+ 3 6
		7	*IPE*	1624 1 1622 2	−13 8	*IPE*	2617 4 2616 1	− 3 8
		,, 8	*IPE*	1608 3 1606 6	+ 2 2	*IPW*	2606 9 2604 0	− 7 7

* The angle 84 17 is the zenith distance of the meridian mark at the longitude station C_0 is the mean reading of the telescope micrometer deduced from the several determinations of the collimation error the latter terms of both formulæ is due to the dislevelment of the transit axis the determination of which together with the meaning of the symbol M are explained in Section 4 of this chapter

In 1892 on the six nights that observations were taken on the Fyzabad–Dehra Dun Arc, the readings named C_M and the resultant values of deviation were as follows —

Arc	Station	Date			C_M	a
FYZABAD–DEHRA DÚN	DEHRA DUN (Telescope No 1)	March	15	*I P W*	1497 1	d −19 3
		„	16	*I P W*	1489 3	−27 1
		,	17	*I P E*	1524 3	− 8 0
			18	*I P E*	1526 3	−10 2
		„	19	*I P E*	1528 5	−12 4
		,	20	*I P W*	1512 1	− 4 4

6

Table III Abstract of Observed Values of Personal Equation

Table III contains an abstiact of the individual values of personal equation observed during the seasons 1885 86, 1887 88 1889 90 and 1891 92 by the method of divided transits with the same telescope, as described in Chapter IV The heading of the table shows which transit telescope was in use and the results are entered in two groups according as the stars observed were of north or south aspect lastly the observations are entered in three columns under the dates on which they are made, the first giving the number of the star in the British Association Catalogue the second its declination and the third the difference in seconds of time between the reduced transits by the two observers The letters S H B and C symbolize respectively the four observers Colonel G Strahan, Lieut Colonel W J Heaviside Captain S G Burrard and Lieutenant G P Lenox Conyngham, and the subscripts N and S refer to the aspect of the stars observed The quantity S — H is obtained by subtracting the time of transit as noted by Lieut Colonel Heaviside from that noted by Colonel Strahan, and must be added algebraically to Lieut Colonel Heaviside s observations to make them comparable with Colonel Strahan s

7.

Table IV Deduction of the Final Values of the Relative Personal Equation

In *Table IV* the mean results of *Table III* are abstracted in two divisions, according to the aspect of the stars observed the dates, telescope used and mean values of the equation are given The final values of the equation adopted for use in the reduction of the observations follow the table

8

Reduction of Star Observations—Explanation of the Terms $\delta L - \rho$ *and* $\delta L + \rho$

In *Table V* the star observations are given in abstract, and their reduction is carried out to the determination of the quantities $\delta L - \rho$ and $\delta L + \rho$ $\delta L \mp \rho$ (generally) is the difference between the

corrected times of transit of the same star over both meridians, the time at east being always subtracted from that at west station Here it is evident that, if the clock in use were rated to keep true time and if its beats were recorded at both stations synchronously—and also if there were no errors of observation, and no personal equation—then the difference between the times of transit of the same star at the two stations would be exactly equal to the difference of longitude But the result actually obtained is affected—in addition to errors of observations and personal equation—(1) by the rate of the clock during the interval between the transits at the two stations, and (2) by the retardation of the beats of the clock transmitted through the wire and relays to the distant station A correction for clock rate is applied in these tables, but the retardation—which is called ρ—remains for elimination at a later period

9

The Sign of ρ

The correction for ρ changes its sign according to the clock in use The retardation always causes the times of observations made at the far station, *i e*, the station receiving the clock beats through the line, to appear slow as compared with those obtained from the clock at its own station because the time at the far station is recorded by beats of the clock, which are generated an instant earlier than they are received, the interval being ρ Therefore whichever clock is in use, ρ has the effect of increasing the time recorded at the distant station and as the difference between the observed times of transit is always obtained in *Table V* by subtracting east from west time, the correction it requires is $+ \rho$ when east clock, and $- \rho$ when west clock, is used It should be noted that the quantity ρ includes all sources of retardation, those arising from the instruments employed in the observatories to generate the signals transmitted, or to record those received, as well as the simple time of transmission of a signal through the line wire between the stations

There is no way in which ρ can be determined separately for each clock, *i e*, for the transmission of signals in opposite directions through the line and it is therefore necessary to consider it the same for both Any variation from such equality is probably very small in proportion to the whole quantity, and as it arises chiefly from irregularities in the action of relays and chronograph pens in the observatories, it must be itself irregular, and liable to elimination in a series of observations

10

Explanation of Table V

This table is arranged in groups each exhibiting the results of the measurement of one arc

The names of the stations and their approximate latitudes and longitudes are entered at the head, and below this, the central part of the body of the table is divided into halves—the left hand and right hand portions being assigned to the observations at the east and west station, respectively outside of these to the left and right are some columns common to both stations

Beginning from the left hand,

Column 1 contains the astronomical date

„ 2 contains the British Association Catalogue number of the star observed

„ 3 contains the star's approximate declination

Columns 4 and 9 shew the aspect under which the star was observed at each station, N and S meaning that the observer sat facing the north or the south, respectively

Columns 5 and 10 indicate the position of the instrument, and give the correction constants for each group of observations The letters *I P E* or *I P W* mean that the illuminated pivot of the transit telescope was east or west, respectively—a position that was never altered during the work of any one night except for some of the arcs measured in the season 1885 86 c and b are the correction constants for collimation (including diurnal aberration) and level, abstracted from *Table I* a is the deviation correction abstracted from *Table II*, and is generally the mean of the several values of a for each night c, b and a are expressed in divisions of the micrometer Q is the correction for pen equation in seconds of time, the sign of which usually changes after each group

Columns 6 and 11 contain the mean observed time of transit at each station for each star The transit of a star was generally observed over fifteen wires, the individual observations were reduced to the central wire, and the mean of all is here given These reductions are effected by multiplying the known equatorial wire intervals by the secant of the declination of the star observed, and applying the products to the observed times of individual wires by addition or subtraction as the case may be

Columns 7 and 12 In these columns under the head of Total Correction", the sum of the corrections for collimation level deviation and pen equation, Q, is given With the data afforded, *viz*, the latitude of the station, the declination of the star, the value of the telescope micrometer (*i e*, $1^d = 0$ 0225, *vide* page 2 of Part II of this volume) and the constants c b a and Q, the separate corrections can be computed, and the quantities in columns 7 and 12 checked

Columns 8 and 13 contain the seconds of the corrected times of transit, obtained simply by taking the sum of the quantities in the two preceding columns

Column 14 contains the difference between the corrected times of transit of each star at the two stations, east time being always subtracted from west

15 contains the mean of each group in the preceding column

16 contains a correction required on account of clock rate the quantity in column 15 is a direct difference between two observed times by the same clock and is therefore effected by the rate of that clock during the interval between the observations The corrections for rate used in this table are deduced in *Table VI*

The quantities in the seventeenth column are obtained from *Table IV* The last column contains the sum of the quantities in the three preceding columns, entered under the head of $\delta L - \rho$ or $\delta L + \rho$, according as it is deduced from observations with east or west clock, respectively

11

Table VI Deduction of Clock Rate Corrections from the Observations of Transits

Clock rate corrections for the intervals between nights of observation were found by comparing the corrected transits of the same stars on successive days, and are entered under the head a In doing this the effect of change in the right ascensions of the stars observed was not lost sight of but this effect was found in all cases to be quite inappreciable For all the arcs measured each observer obtained a value of the rate corrections, a for each clock and from the means of these quantities, hourly rate corrections, β, are interpolated for each night of observation The correction to be applied to the difference of observed times of transits, is simply the quantity β for the night, multiplied by the difference of longitude in decimals of an hour, and these products are shewn in this table

12.

Table VII Deduction of the Difference of Longitude, ΔL and the Retardation of Signals, ρ

The final results are arrived at in this table

Column 1 contains the astronomical date, and column 2 which is divided into two parts gives the instrumental position

Columns 3, 4, 6 and 7 are the results obtained by the method of transits at both stations with the same clock and are abstracted for each date from *Table V* Means for each instrumental position and a general mean follow as before The final value of ΔL is obtained by taking the mean of the final values of $\Delta L - \rho$ and $\Delta L + \rho$ which are given at the foot of columns 5 and 8 The value of ρ is obtained by taking half the difference of the final values of $\Delta L - \rho$ and $\Delta L + \rho$ from columns 5 and 8

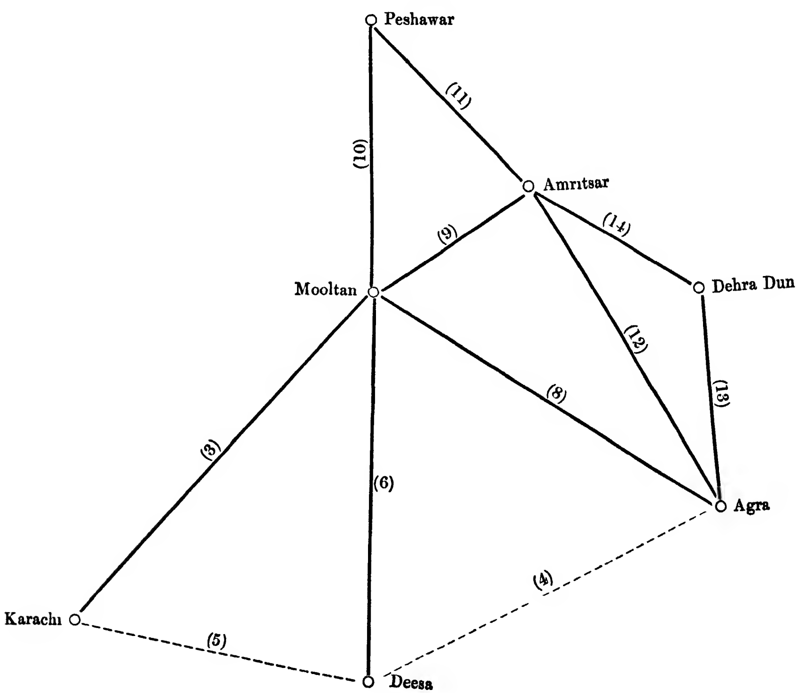
CHAPTER VI

DETAILED ACCOUNT OF THE OPERATIONS OF EACH SEASON

1

Arcs measured during the Season 1885 86

In the annexed diagram the arcs measured during the season 1885 86 are shown in black lines and numbered for convenience of reference Two arcs previously measured which are required to make clear the connection of this season's operations with former work are indicated by dotted lines



The descriptions contained in the preceding five chapters apply throughout to the work of this season, and it is only necessary to remark in passing that the system of changing pivots was as follows —On the arcs numbered (6) (8) and (12) the telescope at the eastern station had its pivots reversed in the middle of work every night, (*i e* between the second and third groups of stars) and that at the western station at the close of each night s observations Subsequently it was decided that the uncertainty of the telescope taking up at once a permanently stable position immediately after reversal more than counterbalanced the advantages aimed at *viz* the systematic variation as far as possible of the circumstances under which the observations were made and on the remaining arcs, numbered (3) (9), (10) (11) (13) and (14) in the diagram the telescope at the eastern station was reversed after the first, third and fifth nights, and that at the western station after the second, fourth and sixth

In consequence of the magnitude of the circuit errors that had appeared in previous seasons it was decided to interchange observers on one arc of this season and also to measure an experimental arc at Dehra Dun The arc Agra–Amritsar was the one selected for the interchange of observers and accordingly after four nights had been completed Major Strahan moved from Agra to Amritsar and Major Heaviside from Amritsar to Agra four more nights work was then added Major Strahan using Major Heaviside s clock, chronograph and telescope and Major Heaviside using Major Strahan s The result arrived at by the observations taken when Major Strahan was at Agra and Major Heaviside at Amritsar differed from the result when Major Heaviside was at Agra and Major Strahan was at Amritsar by o o31 On the experimental arc at Dehra Dun the two telescopes were placed on the same meridian one a few feet south of the other and the whole procedure was gone through of measuring their difference of longitude the result was most disappointing the difference of longitude was known to be o oo but the final value derived from 120 stars came out o 19

At the close of the field season 1883 84 owing to the occurrence of objectionably large circuit errors* the two transit instruments had been sent to England to be examined by the makers and to have certain defects if possible remedied and Major G Strahan who was on furlough in England was asked to inspect the instruments when the makers reported their work complete through the kindness of the Astronomer Royal a site was placed at his disposal in the enclosure of Greenwich Observatory shelter was afforded for the telescopes and chronograph and electric communication with the standard sidereal clock was allowed Major Strahan made an exhaustive examination of both telescopes and declared himself satisfied that the instrumental defects had been removed In October 1885 a further series of experimental observations were taken at Agra by Major Heaviside and the results obtained were sufficiently satisfactory to justify the resumption of regular operations

The behaviour of the instruments throughout the season 1885 86 was such as to give every confidence in their perfection but when the results came to be reduced it was found that there was still a mysterious source of very appreciable error Out of five verificatory circuits, three exhibited large errors between a quarter and a third of a second of time, and the result of the experimental arc at Dehra Dun shewed that there might be an error of o^s 19 in a single arc A few years afterwards the cause of these errors was discovered (*vide* Part IV of this volume) and the introduction of a mean value of C_0 in place of the nightly values as formerly used reduced the average circuit error of the season 1885 86 from o 281 to o o36 the value of the experimental arc at Dehra Dun was also reduced from o 19 to o 07 As is explained in Part IV, the original circuit errors have been proved to be in no way due to bad observations, but to faults in the object glasses of the collimators and the effect of these latter is so entirely eliminated by the use of a mean C_0, that there was no necessity whatever

* *Vide* Section 10 of Chapter VI of Volume X of the ***Account of the Operations of the Great Trigonometrical Survey of India***

to re observe the arcs of 1885 86 their reduction, as printed in Part II has been carried out on the new method, and their values, as originally computed, have been rejected and are not shewn in this volume The final values given on pages 122–130 of Part II may be accepted without hesitation

In March 1887 the experimental arc at Dehra Dun was re measured in detail on four separate occasions, four full nights' work being devoted to each measurement On the first occasion Capt Burrard was at the southern station with Telescope No 1, and Mr Eccles at the northern with Telescope No 2 during the second measurement Mr Eccles worked with Telescope No 1 at the southern station and Capt Burrard with Telescope No 2 at the northern The telescopes were then interchanged between the stations, and during the last two measurements Telescope No 1 was north, Mr Eccles observing with it on the third occasion and Capt Burrard on the fourth These four measurements being carried out for experimental purposes only, the details of their reduction have not been included in this volume The resulting values of the arc obtained from the observations were +0 01, +0 02, +0 04, and +0 01, from which it may be concluded that the value +0 07 obtained in 1885 86 was unusually large (An error in the adopted value of Personal Equation would readily account for it)

2

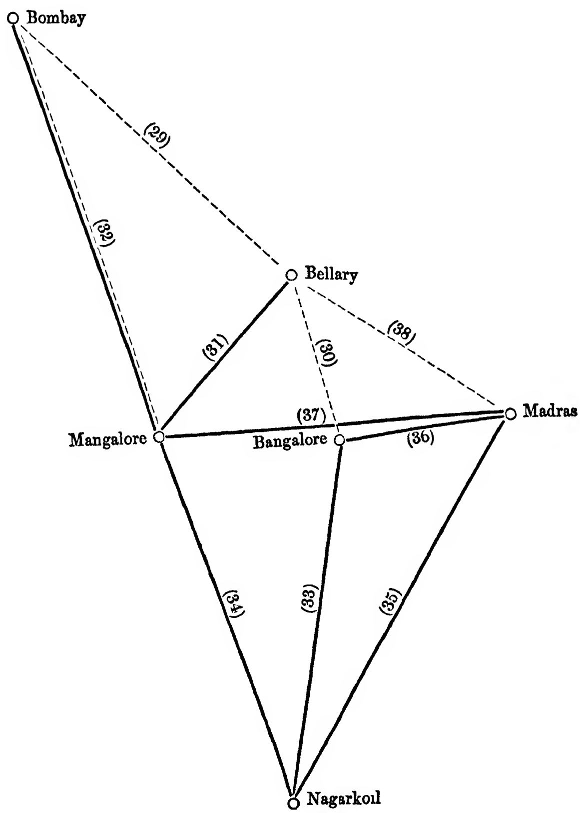
Personal Equation

Personal Equation was measured nine times during the season 1885 86 as follows —Firstly at Agra between Majors Strahan and Heaviside before the commencement of the longitude work proper secondly at Amritsar between Major Strahan and Lieut Burrard then on three occasions at Amritsar and once at Mooltan between Major Heaviside and Lieut Burrard Major Strahan also measured his equation with Major Heaviside at Karachi in February, and with Lieut Burrard at Amritsar in March, and again at Dehra Dun in April The determinations of the value of the equation were made in accordance with the system detailed in Chapter IV and call for no special remark An abstract of the results is given in *Table IV*, page 26, Part II, and on pages 27 and 28 will be found a description of the method that was adopted of dealing with the unusual variations, that appeared in the equation that season

3.

Arcs measured during the Season 1887 88

The following diagram illustrates the operations of the season 1887 88 The arcs measured are shown as before by black lines and those previously measured by dotted lines One of the arcs included had already been observed in 1876 77, and is necessarily represented by both a black and a dotted line



There were no changes in procedure from that of the previous season The telescope at the eastern station had its pivots always reversed after the first, third, and fifth nights of observation, and that at the western station after the second, fourth, and sixth nights

The arc, Mangalore–Bombay, had been previously measured in 1877, but had not then been satisfactorily completed it was therefore re observed in 1888, and the mean of its two measurements has been included in Part IV in the Simultaneous Reduction of all the Indian Arcs

4

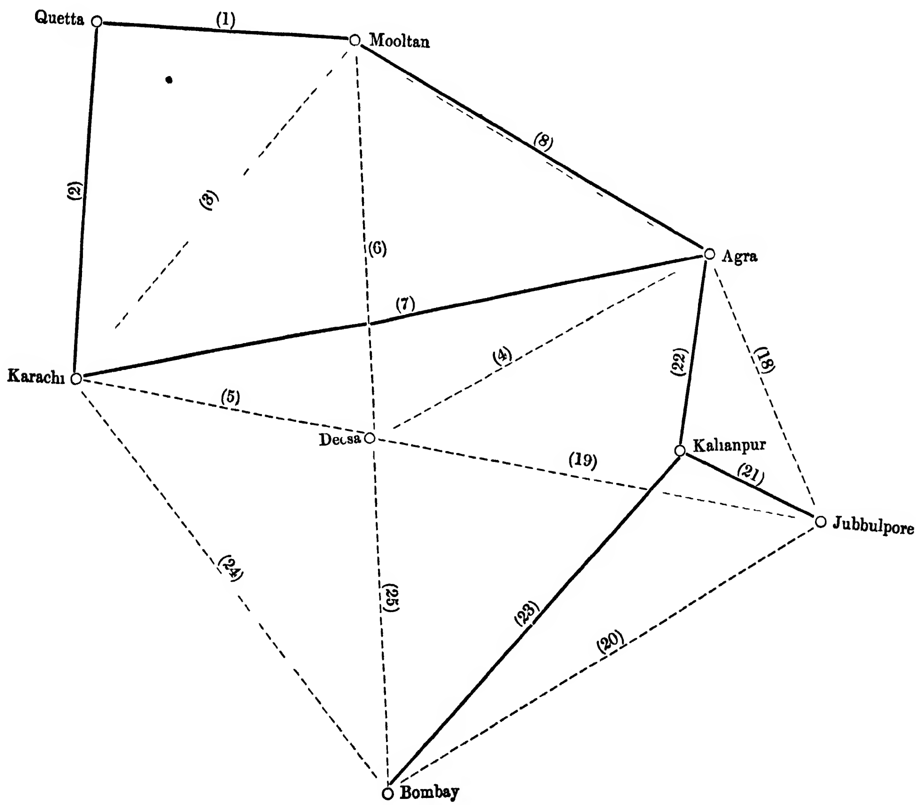
Personal Equation

Personal equation was measured three times during the season 1887 88 as follows —Firstly at Madras before the commencement of the longitude work proper, secondly at Nagarkoil between the measurement of the arcs Bangalore–Nagarkoil and Madras–Nagarkoil, and lastly at Bombay after the conclusion of the season s operations An abstract is given in *Table IV*, page 149, Part II, the results obtained from north and south stars being kept separate as usual

5

Arcs measured during the Season 1889 90

The following diagram illustrates the operations of the season 1889 90 The arcs measured are



shown as before by black lines, and those previously measured by dotted lines arcs re measured are necessarily represented by both a black and a dotted line

In consequence of the magnitude of the circuit errors that had appeared in the season 1885 86, it was decided that two arcs of that season's work, *viz* Agra-Mooltan and Mooltan-Karachi, should be revised in 1889 90 and that an additional arc Agra-Karachi should also be included and measured During this season however the effect on the circuit errors of the introduction of a mean C_0 into the computations was first discovered, and it was then seen that the observations of 1885 86 gave excellent results, and that no necessity existed for revising any of the arcs This was not however found out till the arc Agra-Mooltan had already been revised and Agra-Karachi measured in 1889 but the proposed revision of Mooltan-Karachi was abandoned In the simultaneous reduction in Part IV the mean of its two measurements has been adopted as the final observed value of the arc Agra-Mooltan the measurement of 1889 90 was not however regarded by the observers as deserving of the same weight as that of 1885 86 it was the first occasion that Lieutenant Lenox Conyngham had been employed on astronomical observations, and after its completion the coils of one of Captain Burrard s relays were found to possess an abnormal resistance

6

The Longitude of Kalianpur

Kalianpur is the origin of the Great Trigonometrical Survey of India, the pivot on which the whole triangulation has been hung it is a small deserted village of no political importance situated in the territories of the Nawab of Tonk within three miles of the large city of Sironj It lies near the centre of the Indian continent at the junction of the two most important series of triangulation in India *viz*, (1) the Great Arc which follows the meridian of 78° from Cape Comorin to the Himalayas, and (2) the Great Longitudinal Series that runs from Karachi to Calcutta

In 1889 90 the distances in longitude of Kalianpur from Agra Jubbulpore and Bombay were determined directly by electro telegraphic operations and for this purpose a special line of telegraph had to be constructed 30 miles in length from Bamora a station of the Indian Midland Railway to the observatory at Kalianpur The difference in longitude between Greenwich and Kalianpur has thus been directly determined by the electro telegraphic method It was essential that this should be done as though Kalianpur had been previously connected by triangulation with Bombay Agra and Jubbulpore its longitude as deduced through the triangulation would have been dependent on the values of the earth s axes, that have been adopted in the Indian Survey, and which are known to be in error

7

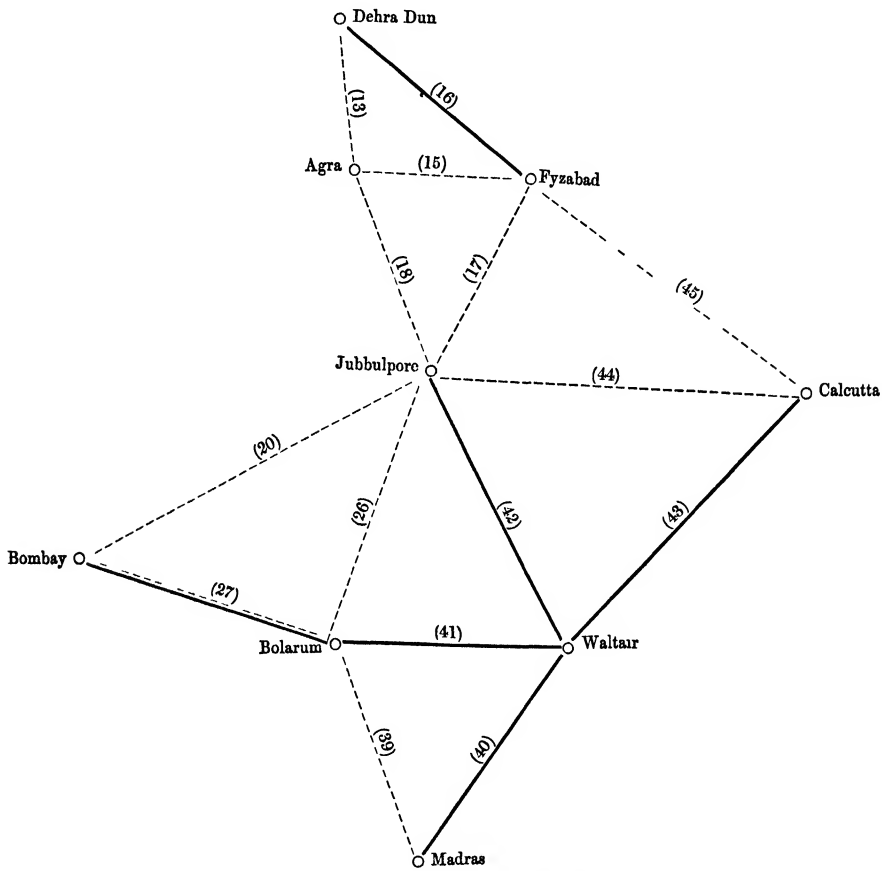
Personal Equation

The observers Captain Burrard and Lieutenant Lenox Conyngham met for the determination of their personal equation four times during the season 1889 90 firstly at Dehra Dun before the commencement of regular longitude operations secondly at Agra between the measurements of the second and third arcs thirdly at Mooltan between the measurements of the fifth and sixth arcs, and lastly at Karachi after the season s work had been completed An abstract of results is given in *Table IV*, page 234 of Part II, the values by north and south stars being kept separate as usual

8.

Arcs measured during the Season 1891 92

The following diagram illustrates the operations of the season 1891 92 The arcs measured are shown as before by black lines, and those previously measured by dotted lines arcs re measured are necessarily represented by both a black and a dotted line



The site of the longitude station at Vizagapatam from which the arcs Vizagapatam-Madras and Vizagapatam-Bellary had been measured in 1877, had been lost* and was no longer available in 1891, a new station was consequently selected at Waltair, within two miles of the old, and four new arcs

* A Roman Catholic Mission School had been erected on the spot.

measured from it, the measurement of the arcs Waltair–Madras and Waltair–Bolarum completed the network over eastern India and rendered the two earlier arcs measured from Vizagapatam redundant they are however included among the recomputed arcs in Part II of this Volume, though not shown in Plate V, nor employed in the simultaneous reduction

The telegraph line from Waltair to Calcutta was 550 miles in length and ran along the coast, owing to the amount of moisture in the atmosphere and to the defective insulation of the line, the electric currents were very weak, and the observers experienced much difficulty in obtaining satisfactory signals, but they succeeded in completing the arc On the following arc Waltair–Jubbulpore, the line ran from Waltair to Jubbulpore *viâ* Calcutta, so that the same length of wire along the coast had to be used as in the preceding arc with the 750 miles from Calcutta to Jubbulpore in addition The observers here entirely failed to make any signals pass, and they were compelled to introduce a translating station at Cuttack, where the signals from one observatory were received and passed on to the other by means of a relay as was feared this arrangement largely increased the value of ρ, which is greater on this arc than on any other measured in India

The arc Bolarum–Bombay was first measured in 1875 76, it was re observed in 1891 92 because its former measurement was somewhat incomplete The result of the observations taken in 1891 92 differed from that obtained in 1875 76 by o o8, a discrepancy that justified the revision

In 1891 92 the old longitude stations at Calcutta and Bolarum were no longer available owing to the encroachments of surrounding buildings, but they were easily identified, and new sites were chosen within a few feet of the old This has necessitated the application of a small geodetic correction to the value of the arcs Calcutta–Waltair, Waltair–Bolarum and Bolarum–Bombay, as measured in 1891 92, to enable these latter to be compared with arcs previously measured.

9

Personal Equation

The observers, Captain Burrard and Lieutenant Lenox Conyngham, met for the determination of their personal equation as follows —Firstly at Karachi before the commencement of regular longitude work, secondly at Bombay about the middle of the season and thirdly at Dehra Dun when the operations had been brought to a close An abstract is given in *Table IV*, page 316 of Part II, the results obtained from north and south stars being kept separate as usual

10

Difficulties experienced in Levelling

In Section 4 of Chapter VI of Volume X of the *Account of the Operations of the Great Trigonometrical Survey of India*, reference was made to the difficulty of obtaining distinct reflexion of the spider lines in the mercury trough at Calcutta owing to the extremely unstable nature of the soil a tremor, it was stated sufficient to obliterate the reflected image of the wires would be set up on the surface of the mercury by the wheels of a passing carriage long before even the sound of the carriage could be heard, and a cough or sneeze would often render the image invisible for a second or two Many expedients were tried with a view to overcoming this difficulty, but without success The following method, which was suggested for use in India by General Walker who received it from a continental astronomer, was adopted to render the surface of the mercury less liable to tremors The mercury

is placed in a very shallow copper trough, the surface of which has been amalgamed with mercury by means of sulphuric acid the effect of this amalgam is that the surface of the copper becomes, so to speak, "wetted," and vibrations of the ground are not communicated to the mercury A trough was constructed, and on the arc Calcutta–Waltair, measured in December 1891 the above method was tried and found to be a complete success perfectly distinct reflexions were obtained even when vehicles were passing within a hundred yards As an experiment the ordinary trough was also tried at the same time, but with the same result as formerly distinct reflexion was never obtained, and generally not even a faint vibrating image was visible till after midnight, when traffic had ceased

In the trough the depth of the mercury does no exceed $\frac{1}{10}$th of an inch, and it might be objected that owing to this small depth the surface of the mercury would lose its horizontality but the level of the telescope was frequently tested both with the continental and the ordinary trough, and their results were never found to differ

11.

Future Operations

It has been proposed at various times to throw a network of longitude arcs over Assam and Upper Burma, and to connect Moulmein (at present the most easterly longitude station in India) with Singapore and Bankok the connection of Gwadar and Bushire on the Persian Gulf with Quetta and Karachi was also at one time contemplated, and the re determination of the absolute longitude of India, east of Greenwich, has been suggested by means of the Teheran telegraph wire These proposals, though not abandoned, will not probably be carried out for some years, and so the network of longitude arcs thrown over India proper has been treated in this volume as *completed*, and the circuit errors have been eliminated by the simultaneous reduction in Part IV

The extension of the longitude arcs east and west to Bankok and Bushire will increase the amplitude of the Indian Arc of longitude by 18½ degrees the connection with Greenwich *viâ* Teheran will be interesting, as at present our knowledge of the absolute longitude of India depends upon two very long arcs, Bombay–Aden and Aden–Suez, both employing a submarine telegraph cable, and also on the arc Suez to Greenwich whose accuracy is not yet proved None of these arcs enter into any circuits, and their observed values have consequently not as yet been subjected to any external check

ELECTRO-TELEGRAPHIC LONGITUDES

PART II

ABSTRACT OF THE OBSERVATIONS

AND

REDUCTION OF THE RESULTS

DURING

1885-86, 1887-88, 1889-90 AND 1891-92.

ELECTRO-TELEGRAPHIC LONGITUDES

1885-86.

INDIAN ARCS.

ABSTRACT OF THE OBSERVATIONS

AND

REDUCTION OF THE RESULTS.

EXPLANATION OF *TABLE I*

"*Abstract of Determinations of Collimation and Level Correction Constants*"

The method followed in making the observations to determine Collimation and Level correction con stants is fully explained in Part I of this volume

The results obtained are given in Abstract in the following table, and the meaning of the symbols used therein are here briefly recapitulated

The contents of the table are divided into groups one for each arc measured and in each group, the left and right hand sides contain data belonging to the East and West stations respectively

All the transit wires are moveable by the telescope micrometer, on the reading of which therefore, the collimation of the telescope depends

In 1884 the Telescopes were sent to Messrs Cooke & Sons in England to be overhauled and have the Telescope tubes strengthened Among other alterations the micrometer screws of both Telescopes were entirely renewed and whereas that of No 2 had previously worked with a reverse motion to that of No 1, they were both now made identical in every way

Column 1 contains the astronomical dates

2 & 11 contain the names of the stations and indicate the telescope in use at each

3 & 12 show the position of the telescopes on each day *I P E* (or *W*) meaning Illuminated Pivot East (or West)

4 & 13 Headed C This is the reading of the telescope micrometer, when so set that the centre wire is collimated as found by observation

5 & 14 Headed C This is the reading of the telescope micrometer as set during the observa tion of star transits The setting is arbitrary and is generally constant for each station

6 & 15 Headed c_1 This is the collimation correction constant It is equal to C − C or C − C when the position of the telescope is *I P E* or *I P W* respectively a mean value of C_o being used per arc

7 & 16 Headed c This is simply c_1 altered to include the correction constant for diurnal aber ration c is used in combination with each star's constant for computing the correction for collimation which therefore includes the correction for diurnal aberration

8 & 17 Headed M M is the reading of the telescope micrometer when the centre wire and its reflection from the mercury coincide

9 & 18 Headed b This is the level correction constant It is equal to $C_o - M$ or $M - C$ when the telescope is *I P E*, or *I P W*, respectively a mean value of C being used per arc

All these quantities are expressed in divisions of the telescope micrometer head the values of which were in 1885 86 as follows —

Telescope No 1, 1 division = $0^s.02228$ Telescope No 2, 1 division = $0^s.02255$

Astronl. Date	Station	Instrumental Position	Collimation C′	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C′	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks
			d	d	d	d	d	d				d	d	d	d	d	d	
1885 Nov 23	AGRA (Telescope No 2)	*I P E* *I P W*	23 5 25 6 27 2	24 0 24 0	+1 6 −1 6	+0 8 −2 4	24 2 32 0	+1 4 +6 4		MOOLTAN (Telescope No 1)	*I P E*	101 9 100 7	100 0	−0 8	−1 6	100 2 100 6	−1 2	
24		*I P W* *I P E*	26 5 24 5 23 4	24 0 24 0	−1 6 +1 6	−2 4 +0 8	24 0 24 5 26 5	−1 6 +0 1			*I P W*	97 3 97 2	100 0	+0 8	0 0	100 9 101 1	+1 8	
25		*I P E* *I P W*	22 5 27 0 28 8	24 0 24 0	+1 6 −1 6	+0 8 −2 4	22 7 32 2 30 5	+2 9 +5 8	Mean C *I P E* = 24 2 *I P W* = 27 0 General Mean = 25 6		*I P E*	100 9 102 4	100 0	−0 8	−1 6	97 2 98 8	+1 2	Mean C *I P E* = 101 4 *I P W* = 97 0 General Mean = 99 2
26		*I P W* *I P E*	27 1 25 1 24 7	25 0 25 0	−0 6 +0 6	−1 4 −0 2	26 7 25 6 26 6	+1 1 −0 5			*I P W*	96 9 97 1	100 0	+0 8	0 0	100 5 100 8	+1 5	
27		*I P E* *I P W*	26 4 25 7 26 5	25 0 25 0	+0 6 −0 6	−0 2 −1 4	26 0 22 9 23 0	−0 4 −2 7			*I P E*	100 5 102 0	100 0	−0 8	−1 6	102 2 102 4	−3 1	
28		*I P W* *I P E*	27 8 23 7 23 9	25 0 25 0	−0 6 +0 6	−1 4 −0 2	28 6 26 1 25 4	+3 0 −0 2			*I P W*	97 5 96 2	100 0	+0 8	0 0	101 0 100 4	+1 5	
Dec 7	DEESA (Telescope No 2)	*I P W* *I P E*	25 8 16 9 17 2	25 0 20 0	+3 6 +1 4	+2 8 +0 (	25 8 4 9 14 9	+4 4 +6 5		MOOLTAN (Telescope No 1)	*I P W*	97 0 97 3	100 0	−0 2	−1 0	100 5 98 8	−0 6	
8		*I P E* *I P W*	6 8 24 7 25 8	20 0 20 0	+1 4 −1 4	+0 6 −2 2	18 2 25 0 23 6	+3 2 +2 9			*I P E*	103 1 103 7	100 0	+0 2	−0 6	100 9 100 2	−0 4	
9		*I P W* *I P E*	25 0 16 3 18 4	20 0 20 0	−1 4 +1 4	−2 2 +0 6	25 7 16 9 17 2	+4 3 +4 4	Mean C *I P E* = 17 2 *I P W* = 25 5 General Mean = 21 4		*I P W*	96 6 97 2	95 0	−5 2	−6 0	95 1 92 5 95 2	−5 9	Mean C *I P E* = 103 1 *I P W* = 97 2 General Mean = 100 2
11		*I P E* *I P W*	17 3 25 4 26 1	20 0 20 0	+1 4 −1 4	+0 6 −2 2	19 1 24 4 25 5	+2 3 +3 6			*I P E*	103 0 103 6	100 0	+0 2	−0 6	103 3 103 8	−3 4	
12		*I P W* *I P E*	25 7 17 4 17 6	20 0 20 0	−1 4 +1 4	−2 2 +0 6	26 4 18 3 17 4	+5 0 +3 6			*I P W*	98 4 96 8	95 0	−5 2	−6 0	97 5 96 3	−3 3	
,, 18		*I P E* *I P W*	17 0 24 5 25 8	20 0 20 0	+1 4 −1 4	+0 6 −2 2	17 7 24 2 24 2	+3 7 +2 8			*I P E*	102 3 102 7	100 0	+0 2	−0 6	104 1 104 1	−3 9	

Astronl Date	Station	Instrumental Position	Collimation C	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks
			d	d	d	d	d	d				d	d	d	d	d	d	
1885 Dec. 21	AGRA (Telescope No 2)	*I P E*	29 7	30 0	−2 5	−3 3	30 0	−2 5		AMRITSAR (Telescope No 1)	*I P E*	103 2				100 0		
		I P W	28 2				26 4					102 8	100 0	+2 0	+1 2	100 4	+1 8	
			26 8	30 0	+2 5	+1 7	27 1	−0 8										
„ 22		*I P W*	26 9	27 0	−0 5	−1 3	27 0	−0 5			*I P W*	100 0				97 3		
		I P E	27 7				29 4					101 5	100 0*	−2 0	−2 8	97 3	−5 6	
			28 5	27 0	+0 5	−0 3	30 3	−2 4								94 5		
„ 23		*I P E*	27 7	27 0	+0 5	−0 3	28 7	−1 2			*I P E*	103 8				100 6		
		I P W	27 1				27 1					103 8	100 0	+2 0	+1 2	102 2	+1 1	
			26 9	27 0	−0 5	−1 3	27 7	−0 1								99 8		
24		*I P W*	25 5	27 0	−0 5	−1 3	26 6	−0 9	Mean C		*I P W*	99 6				97 0		Mean C
		I P E	28 3				28 0		*I P E* = 28 6			99 7	100 0	−2 0	−2 8	95 7	−5 1	*I P E* = 103 5
			29 5	27 0	+0 5	−0 3	28 5	−0 8	*I P W* = 26 4							98 1		*I P W* = 100 4
, 26		*I P E*	29 9	28 0†	−0 5	1 3	28 0		General Mean = 27 5		*I P E*	103 6				102 0		General Mean = 102 0
							31 1	−2 1				100 4	100 0	+2 0	+1 2	100 8	+0 5	
		I P W	27 5	30 0	+2 5	+1 7	24 8	−2 7				104 0				101 8		
, 27		*I P W*	26 7	30 0	+2 5	+1 7	30 9	+3 4			*I P W*	99 3				98 9		
		I P E	28 6	30 0	−2 5	−3 3	27 2	+0 3				100 2	100 0	−2 0	−2 8	100 4	−1 9	
												102 1				101 0		
„ 28		*I P E*	28 0	30 0	−2 5	−3 3	29 1	−1 6			*I P E*	103 8				103 9		
		I P W	25 1	30 0	+2 5	+1 7	28 7	+1 2				104 4	100 0	+2 0	+1 2	105 7	−3 4	
												105 0				106 5		
29		*I P W*	24 3	25 0	−2 5	−3 3	27 1	−0 4			*I P W*	100 2				98 8		
			25 5									100 1	100 0	−2 0	−2 8	100 6	−2 4	
		I P E	28 2	25 0	+2 5	+1 7	26 4	+1 1				101 2				99 3		
1886 Jan. 5	AMRITSAR (Telescope No 1)	*I P W*	99 9				98 3			MOOLTAN (Telescope No 2)	*I P W*	15 1				15 3		
			101 9	100 0	−2 3	−3 1	100 0	−3 2				16 7	16 0	+0 4	−0 4	16 7	+0 5	
												15 7				16 2		
„ 6		*I P E*	104 0				101 9				*I P W*	15 3				15 5		
			104 1	100 0	+2 3	+1 5	100 7	+0 8				15 1	16 0	+0 4	−0 4	14 9	−0 4	
							101 8											
9		*I P E*	105 7	100 0	+2 3	+1 5	102 7	+0 3	Mean C		*I P E*	16 5	16 0	−0 4	−1 2	17 6	−1 2	Mean C
			105 2				101 3		*I P E* = 104 3			15 5				15 9		*I P E* = 16 0
10		*I P W*	100 7				102 2		*I P W* = 100 3		*I P E*	16 2				17 0		*I P W* = 15 1
				100 0	−2 3	−3 1	103 4	+0 7	General Mean = 102 3			16 7	16 0	−0 4	−1 2	17 8	−1 8	General Mean = 15 6
			101 0				103 3											
12		*I P W*	99 2				103 3				*I P W*	15 3				16 4		
				100 0	−2 3	−3 1	103 2	+1 0				14 6	16 0	+0 4	−0 4	17 0	+1 1	
			98 9				103 5											
, 14		*I P E*	104 7	105 0	−2 7	−3 5	107 4	−6 1			*I P W*	14 4	15 0	−0 6	−1 4	14 3	−0 9	
			104 2				109 4					14 7				15 2		
„ 19		*I P E*	104 1								*I P E*	15 8				18 0		
			102 4	105 0	−2 7	−3 5	115 5	−13 2				15 5	15 0	+0 6	−0 2	17 6	−2 2	

* On December 22nd at Amritsar C for Azimuth Star 514 was 95 0

† On December 26th at Agra C for 51 Cephei when observed *I.P.E* was 27 0

Astronl. Date	Station	Instrumental Position	Collimation				Level		Remarks	Station	Instrumental Position	Collimation				Level		Remarks
			C	C	c_1	c	M	b				C	C	c_1	c	M	b	
			d	*d*	*d*	*d*	*d*	*d*				*d*	**d*	*d*	*d*	**d*	*d*	
1886 Jan 27	MOOLTAN (Tel scop No 1)	*I P E*	107 4 108 1	105 0	+1 1	+0 3	106 7 107 4 107 4	−1 1		KARACHI (Telescope No 2)	*I P E*	20 0 19 9	15 0 20 0	+3 0 −2 0	+2 2 −2 8	13 3 19 9 21 7	+4 7 −2 8	
28		*I P W*	103 1 103 6	105 0	−1 1	−1 9	105 5 105 5	−0 6			*I P E*	18 6 19 6	20 0	−2 0	−2 8	21 3 20 4	−2 9	
29		*I P W*	103 9 103 8	105 0	−1 1	−1 9	106 9 106 6 106 9	+0 7	Mean C *I P E* = 108 1 *I P W* = 104 1 General Mean = 106 1		*I P W*	16 5 17 4	15 0	−3 0	−3 8	15 4 14 7 13 9	−3 3	Mean C *I P E* = 19 0 *I P W* = 17 0 General Mean = 18 0
31		*I P E*	107 7 107 8	105 0	+1 1	+0 3	109 2 110 6 111 4	−4 3			*I P W*	16 8 17 2	15 0	−3 0	−3 8	16 8 14 8	−2 2	
Feb 2		*I P E*	108 8 108 6	110 0	−3 9	−4 7	109 0 109 7 109 5	−3 3			*I P E*	18 8 17 5	20 0	−2 0	−2 8	19 2 19 9	−1 6	
8		*I P W*	105 3 104 8	105 0	−1 1	−1 9	104 2 103 4 105 0	−1 9			*I P E*	19 0 18 4	18 0	0 0	−0 8	19 0 20 6	−1 8	
Feb 9	PESHAWAR (T lescope No 1)	*I P E*	102 8 104 8	100 0	+6 1	+5 3	101 2 102 7	+4 2		MOOLTAN (Telescope No 2)	*I P E*	18 5 19 4	18 0	+2 2	+1 4	18 1 19 8	+1 3	
10		*I P W*	106 4 108 1	105 0	−1 1	−1 9	107 4 1 6 3	+0 8			*I P E*	18 6 17 5	18 0	+2 2	+1 4	19 5 18 9	+1 0	
, 11		*I P W*	106 9 108 5	105 0	−1 1	−1 9	108 8 108 8	+2 7	Mean C *I P E* = 104 6 *I P W* = 107 6 General Mean = 106 1		*I P W*	23 3 22 6	25 0	+4 8	+4 0	23 4 22 8	+2 9	Mean C *I P E* = 19 2 *I P W* = 21 2 General Mean = 20 2
12		*I P E*	104 3 103 6	105 0	+1 1	+0 3	102 1 100 6	+4 8			*I P W*	20 1 18 7	22 0	+1 8	+1 0	20 1 20 4	+0 1	
17		*I P E*	106 8 105 3	105 0	+1 1	+0 3	103 6 102 2	+3 2			*I P E*	18 2 20 1	18 0	+2 2	+1 4	17 5 18 8	+2 1	
18		*I P W*	108 1 107 7	110 0	+3 9	+3 1	107 7 110 5	+3 0			*I P E*	20 9 20 2	20 0	+0 2	−0 6	21 1 20 7	−0 7	
Feb 24	AMRITSAR (Telescope No 2)	*I P W*	21 9 20 6	22 0	−0 7	−1 5	21 4 21 6	−1 2		PESHAWAR (Telescope No 1)	*I P W*	106 7 108 4	105 0	−0 5	−1 3	106 9 107 6	+1 8	
Mar 4		*I P E*	23 1 25 4	22 0	+0 7	−0 1	23 0 23 8	−0 7			*I P W*	106 7 107 4	105 0	−0 5	−1 3	106 1 106 4	+0 8	
" 11		*I P E*	23 4 24 0	23 0	−0 3	−1 1	23 9 24 0	−1 3	Mean C *I P E* = 23 2 *I P W* = 22 2 General Mean = 22 7		*I P E*	104 3 104 5	105 0	+0 5	−0 3	105 3 106 1	−0 2	Mean C *I P E* = 104 1 *I P W* = 106 9 General Mean = 105 5
, 13		*I P W*	21 6 21 7	22 0	−0 7	−1 5	21 7 20 8	−1 5			*I P E*	103 7 103 8	105 0	+0 5	−0 3	103 8 104 1	+1 6	
" 19		*I P W*	23 7 23 8	24 0	+1 3	+0 5	24 1 23 0	+0 9			*I P W*	106 8 106 3	105 0	−0 5	−1 3	106 3 106 9	+1 1	
20		*I P E*	21 9 21 8	21 0	+1 7	+0 9	22 5 23 2	−0 2			*I P W*	105 8 106 8	105 0	−0 5	−1 3	106 5 105 7	+0 6	

* C_s = 15 0, M = 13 3 for observations with E Clock, C_s = 20 0, M = 20 8 for observations with W Clock.

Astronl Date	Station	Instrumental Position	Collimation C	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks
			d	d	d	d	d	d				d	d	d	d	d	d	
1886 Apr 1	DEHRA DUN (Telescope No 2)	*I P E*	14 1 15 0	13 0	+3 1	+2 3	14 9 15 2	+1 0		AMRITSAR (Telescope No 1)	*I P E*	13 1 12 6	15 0	−2 7	−3 5	15 1	−2 8	
2		*I P W*	16 1 16 8	17 0	+0 9	+0 1	15 6 15 9	−0 4			*I P E*	13 7 13 6	15 0	−2 7	−3 5	13 9 13 9	−1 6	
8		*I P W*	16 7 16 6	17 0	+0 9	+0 1	17 4 18 7	+2 0	Mean C *I P E* = 15 5 *I P W* = 16 6		*I P W*	9 9 10 8	10 0	−2 3	−3 1	9 3 7 3	−4 0	Mean C *I P E* = 13 5 *I P W* = 11 1
10		*I P E*	16 1 15 8	16 0	+0 1	−0 7	16 8 15 2	+0 1	General Mean = 16 1		*I P W*	11 1 11 9	10 0	−2 3	−3 1	8 6 10 4	−2 8	General Mean = 12 3
11		*I P E*	15 5 16 0	15 0	+1 1	+0 3	15 1 14 0	+1 6			*I P E*	13 3 14 5	15 0	−2 7	−3 5	13 8 14 0	−1 6	
12		*I P E*	15 7 15 4	15 0	+1 1	+0 3	15 2 13 8	+1 6			*I P W*	11 5 11 6	10 0	−2 3	−3 1	10 1 7 8	−3 4	
Apr 20	DEHRA DUN (Telescope No 2)	*I P E*	12 9 14 5	12 0	+2 0	+1 2	13 3 15 1	−0 2		AGRA (Telescope No 1)	*I P E*	9 2 9 7	10 0	−1 8	−2 6	10 8 11 1	−2 8	
21		*I P W*	14 7 13 0	15 0	+1 0	+0 2	1 2 13 4	−0 7			*I P E*	10 5 9 0	10 0	−1 8	−2 6	9 0 11 0	−1 8	
22		*I P W*	15 5 14 7	15 0	+1 0	+0 2	14 2 15 6	+0 9	Mean C *I P E* = 13 4 *I P W* = 14 5		*I P W*	7 4 7 1	10 0	+1 8	+1 0	9 8 10 1	+1 8	Mean C *I P E* = 10 0 *I P W* = 6 3
, 23		*I P E*	13 2 13 4	13 0	+1 0	+0 2	13 2 13 6	+0 6	General Mean = 14 0		*I P W*	4 6 6 0	5 0	−3 2	−4 0	7 4 5 6	−1 7	General Mean = 8 2
24		*I P E*	13 8 12 4	13 0	+1 0	+0 2	15 9 15 9	− 9			*I P E*	10 5 9 9	10 0	−1 8	−2 6	10 6 12 3	−3 3	
25		*I P W*	14 0 14 9	14 0	0 0	−0 8	14 2 17 2	+1 7			*I P E*	10 2 10 9	10 0	−1 8	−2 6	9 3 13 7	−3 3	
May 5	DEHRA DUN (Telescop No 2)	*I P W*	13 8 14 2	14 0	+0 9	+0 1	12 9 13 6	+0 2		DEHRA DUN (Telescope No 1)	*I P W*	10 4 10 8	10 0	+0 5	−0 3	11 9 13 6	+3 3	
6		*I P E*	12 3 11 5	12 0	+1 1	+0 3	10 1 11 2	+2 5	Mean C *I P E* = 12 5 *I P W* = 13 6		*I P W*	12 0 12 4	10 0	+0 5	−0 3	12 1 11 8	+2 5	Mean C *I P E* = 7 6 *I P W* = 11 4
7		*I P E*	13 7 12 4	12 0	+1 1	+0 3	12 9 14 1	−0 4	General Mean = 13 1		*I P E*	6 5 7 9	5 0	+4 5	+3 7	5 8 8 7	+2 3	General Mean = 9 5
» 8		*I P W*	13 4 12 8	14 0	+0 9	+0 1	12 0 12 9	−0 7			*I P E*	7 7 8 1	5 0	+4 5	+3 7	6 4 6 3	+3 2	

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pendulum Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
									h m	s	s	s	s	s	h m s	m s	d
AGRA (E) AND MOOLTAN (W)	AGRA (Latitude 27 10)	1885 Nov 23	*I P E*	E	326 Gr 72	U	4	−0 2987	3 29 31 18	+0 28	+0 25	−1 50		30 21	3 29 39 59	+ 0 9 38	−13 7
			I P E		1402	L	5	+0 1345	3 35 38 88	−0 11	−0 06	−1 50	0 00	37 21	3 35 40 65	+ 0 3 44	
			I P W	W	1556 ,	L	5	+0 1573	4 31 53 52	+0 40	−0 35	−1 51		52 06	4 57 30 88	+25 38 82	− 6 8
			I P W		514	U	4	−0 2253	5 0 6 08	−0 64	+0 90	−1 51	−0 13	4 70	5 25 46 13	+25 41 43	
		24	*I P W*	E	326 Gr 72	U	4	−0 2987	3 29 31 63	−0 83	−0 29	−1 52		28 99	3 29 39 59	+ 0 10 69	−10 9
			I P W		1402	L	5	+0 1345	3 35 35 88	+0 34	+0 07	−1 52	0 00	34 77	3 35 40 66	+ 0 5 89	
			I P E	W	1506	L	5	+0 1573	4 32 4 02	−0 13	−0 01	−1 2		2 36	4 57 30 83	+25 28 47	−29 3
			I P E		514	U	5	−0 2253	5 0 8 00	+0 21	+0 01	−1 52	−0 11	6 59	5 25 46 27	+25 39 68	
		25	*I P E*	E	326 Gr 72	U	4	−0 2987	3 29 22 5	+0 28	+0 52	−1 43		21 52	3 29 39 59	+ 0 18 0	−32 7
			I P E		1402	L	5	+0 1345	3 35 38 42	−0 11	−0 13	−1 43	0 00	36 75	3 35 40 66	+ 0 3 91	
			I P W	W	15 6	L	4	+0 1573	4 32 9 03	+0 40	−0 32	−1 66		7 45	4 57 30 77	+25 23 32	−25 4
			I P W		514	U	5	−0 2253	5 0 14 94	−0 64	+0 82	−1 66	−0 12	13 34	5 25 46 40	+25 33 06	
		26	*I P W*	E	326 Gr 72	U	4	−0 2987	3 29 23 83	−0 49	+0 20	−1 65		21 89	3 29 39 58	+ 0 17 69	−26 1
			I P W		1402	L	5	+0 1345	3 35 35 74	+0 20	−0 05	−1 65	0 00	34 24	3 35 40 67	+ 0 6 43	
			I P E	W	1556	L	5	+0 1573	4 32 9 58	+0 03	+0 03	−1 66		7 98	4 57 30 71	+25 22 73	+10 9
			I P E		514	U	4	−0 2253	5 0 29 88	−0 05	−0 07	−1 66	−0 12	27 98	5 25 46 54	+25 18 56	
		„ 27	*I P E*	E	326 Gr 72	U	4	−0 2987	3 29 33 35	−0 07	−0 07	−1 61		31 60	3 29 39 58	+ 0 7 98	+ 8 6
			I P E		1402	L	5	+0 1345	3 35 30 52	+0 03	+0 02	−1 61	0 00	28 96	3 35 40 68	+ 0 11 72	
			I P W	W	1556	L	4	+0 1573	4 32 16 73	+0 23	+0 15	−1 64		15 47	4 57 30 66	+25 15 19	+ 1 8
			I P W		514	U	4	−0 2253	5 0 34 70	−0 37	−0 38	−1 64	−0 12	32 19	5 25 46 68	+25 14 49	
		28	*I P W*	E	326 Gr 72	U	4	−0 2987	3 29 33 68	−0 49	+0 54	−1 65		32 08	3 29 39 58	+ 0 7 50	+11 1
			I P W		1402	L	5	+0 1345	3 35 29 94	+0 20	−0 13	−1 65	0 00	28 36	3 35 40 68	+ 0 12 32	
			I P E	W	1556	L	5	+0 1573	4 32 21 10	+0 03	+0 01	−1 63		19 51	4 57 30 60	+25 11 09	+18 1
			I P E		514	U	4	−0 2253	5 0 44 48	−0 05	−0 03	−1 63	−0 12	42 65	5 25 46 81	+25 4 16	
	MOOLTAN (Latitude 30 11′)	1885 Nov 23	*I P E*	E	326 Gr 72	U	4	−0 2854	3 56 7 57	−0 55	−0 23	−1 50		5 29	3 29 39 59	−26 25 70	+46 5
					1402 „	L	3	+0 1305	4 1 48 21	+0 23	+0 06	−1 50	0 00	47 00	3 35 40 65	−26 6 35	
				W	1556	L	3	+0 1523	4 58 6 28	+0 27	+0 07	−1 50		5 12	4 57 30 88	− 0 34 24	+38 8
					514	U	4	−0 2149	5 26 36 83	−0 42	−0 18	−1 50	−0 13	34 60	5 25 46 13	− 0 48 47	
		„ 24	*I P W*	E	326 Gr 72	U	4	−0 2854	3 55 58 52	0 00	+0 35	−1 50		57 37	3 29 39 59	−26 17 78	+20 2
					1402 „	L	3	+0 1305	4 1 51 62	0 00	−0 09	−1 50	0 00	50 03	3 35 40 66	−26 9 37	
				W	1556	L	4	+0 1523	4 58 16 05	0 00	−0 11	−1 50		14 44	4 57 30 83	− 0 43 61	+15 6
					514 „	U	4	−0 2149	5 26 36 97	0 00	+0 27	−1 50	−0 12	35 62	5 25 46 27	− 0 49 35	

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
AGRA (E) AND MOOLTAN (W)	MOOLTAN (Latitude 30 11')	1885							h m s	s	s	s	s	s	h m s	m s	d
				E	326 Gr 72	U	3	−0 2854	3 55 54 37	−0 55	+0 23	−1 50		52 55	3 29 39 59	−26 12 96	+ 8 9
		Nov 25	*I P E*		1402	L	4	+0 1305	4 1 51 23	+0 23	−0 06	−1 50	+0 01	49 91	3 35 40 66	−26 9 25	
				W	1556	L	4	+0 1523	4 58 23 87	+0 27	−0 07	−1 50		22 57	4 57 30 77	− 0 51 80	+ 3 5
					514	U	4	−0 2149	5 26 41 32	−0 42	+0 18	−1 50	−0 11	39 47	5 25 46 40	− 0 53 07	
				E	326 Gr 72	U	4	−0 2854	3 56 8 69	0 00	+0 29	−1 50		7 48	3 29 39 58	−26 27 90	+65 1
		26	*I P W*		1402 ,	L	4	+0 1305	4 1 43 09	0 00	−0 08	−1 50	0 00	41 51	3 35 40 67	−26 0 84	
				W	1556	L	5	+0 1523	4 58 22 08	0 00	−0 09	−1 50		20 49	4 57 30 71	− 0 49 78	+57 4
					514	U	2	−0 2149	5 26 58 80	0 00	+0 23	−1 50	−0 13	57 40	5 25 46 54	− 1 10 86	
				E	326 Gr 72	U	3	−0 2854	3 55 54 72	−0 55	−0 60	−1 50		52 07	3 29 39 58	−26 12 49	+14 9
		27	*I P E*		1402	L	4	+0 1305	4 1 48 10	+0 23	+0 16	−1 50	0 00	46 99	3 35 40 68	−26 6 31	
				W	1556	L	4	+0 1523	4 58 34 50	+0 27	+0 19	−1 50		33 46	4 57 30 66	− 1 2 80	+11 4
					514 ,	U	3	−0 2149	5 26 56 16	−0 42	−0 47	−1 50	−0 12	53 65	5 25 46 68	− 1 6 97	
				E	326 Gr 72	U	5	−0 2854	3 55 54 10	0 00	+0 29	−1 50		52 89	3 29 39 58	−26 13 31	+18 7
		28	*I P W*		1402	L	5	+0 1305	4 1 47 80	0 00	−0 08	−1 50	0 00	46 22	3 35 40 68	−26 5 54	
				W	1556	L	5	+0 1523	4 58 40 68	0 00	−0 09	−1 50		39 09	4 57 30 60	− 1 8 49	+14 4
					514	U	7	−0 2149	5 27 1 99	0 00	+0 23	−1 50	−0 12	0 60	5 25 46 81	− 1 13 79	
DEESA (E) AND MOOLTAN (W)	DEESA (Latitude 24 16')	1885															
			I P W	E	1556 Gr 72	L	5	+0 1599	4 57 36 69	−0 46	−0 22	−1 71		34 30	4 57 30 28	− 0 4 02	− 4 8
		Dec 7	*I P W*		514	U	4	−0 2322	5 25 50 33	+0 74	+0 56	−1 71	0 00	49 92	5 25 47 77	− 0 2 15	
			I P E	W	δ Ursæ Minoris	L	2	+0 3568	6 5 51 81	−0 23	−0 89	+1 71		52 40	6 8 46 25	+ 2 53 85	−12 4
			I P E		51 Cephei	U	3	−0 4138	6 44 2 06	+0 28	+1 36	−1 71	+0 01	2 00	6 47 5 42	+ 3 3 42	
			I P E	E	1556 Gr 72	L	5	+0 1599	4 57 36 34	−0 10	−0 16	−1 71		34 37	4 57 30 27	− 0 4 10	− 6 1
		„ 8	*I P E*		514	U	4	−0 2322	5 25 50 71	+0 16	+0 41	−1 71	−0 01	49 56	5 25 47 85	− 0 1 71	
			I P W	W	δ Ursæ Minoris	L	3	+0 3568	6 5 45 17	+0 83	−0 40	+1 70		47 30	6 8 46 05	+ 2 58 75	− 1 7
			I P W		51 Cephei	U	3	−0 4138	6 44 7 82	−1 01	+0 61	−1 70	+0 01	5 73	6 47 5 77	+ 3 0 04	
			I P W	E	1556 Gr 72	L	5	+0 1599	4 57 34 85	+0 37	−0 22	−1 70		33 30	4 5 30 25	− 0 3 05	+ 3 4
		9	*I P W*		514 „	U	5	−0 2322	5 25 54 05	−0 59	+0 55	−1 70	−0 01	52 30	5 25 47 93	− 0 4 37	
			I P E	W	δ Ursæ Minoris	L	3	+0 3568	6 5 48 76	−0 23	−0 60	+1 70		49 63	6 8 45 85	+ 2 56 22	− 9 8
			I P E		51 Cephei	U	3	−0 4138	6 44 2 82	+0 28	+0 92	−1 70	+0 01	2 33	6 47 6 10	+ 3 3 77	
			I P E	E	1556 Gr 72	L	5	+0 1599	4 57 42 29	−0 10	−0 12	−1 71		40 36	4 57 30 23	− 0 10 13	−31 8
		„ 11	*I P E*		514	U	5	−0 2322	5 25 47 00	+0 16	+0 29	−1 71	−0 02	45 72	5 25 48 07	+ 0 2 35	
			I P W	W	δ Ursæ Minoris	L	3	+0 3568	6 5 53 85	+0 83	−0 49	+1 71		55 90	6 8 45 51	+ 2 49 61	−29 8
			I P W		51 Cephei	U	3	−0 4138	6 43 56 07	−1 01	+0 75	−1 71	0 00	54 10	6 47 6 70	+ 3 12 60	

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for				Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
										Collimation	Level	Pen Equation Q	Approximate Clock Rate				
		1885							h m s	s	s	s	s	s	h m s	m s	d
DEESA (E) AND MOOLTAN (W)	DEESA (Latitude 24 16')		*I P W*	E	1556 Gr 72	L	5	+0 1599	4 57 39 95	+0 37	−0 25	−1 69		38 38	4 57 30 22	− 0 8 16	−15 5
		Dec 12	*I P W*		514	U	5	−0 2322	5 25 51 86	−0 59	+0 64	−1 69	−0 02	50 20	5 25 48 13	− 0 2 07	
			I P E	W	δ Ursæ Minoris	L	3	+0 3568	6 5 52 93	−0 23	−0 49	+1 72		53 91	6 8 45 37	+ 2 51 46	−21 7
			I P E		51 Cephei	U	3	−0 4138	6 43 59 43	+0 28	+0 75	−1 70	+0 01	58 77	6 47 6 96	+ 3 8 19	
			I P E	E	1556 Gr 72	L	5	+0 1599	4 57 41 52	−0 10	−0 19	−1 63		9 60	4 57 30 21	− 0 9 39	−13 4
		13	*I P E*		514	U	5	−0 232	5 25 53 35	+0 16	+0 47	−1 63	−0 02	52 33	5 25 48 20	− 0 4 13	
			I P W	W	δ Ursæ Minoris	L	3	+0 3568	6 5 45 66	+0 83	−0 38	+1 70		4, 81	6 8 45 24	+ 2 57 43	− 8 6
			I P W		51 Cephei	U	3	−0 4138	6 44 5 27	−1 01	+0 59	−1 70	+0 01	3 16	6 47 7 19	+ 3 4 03	
	MOOLTAN (Latitude 30 11')	1885															
				E	1556 Gr 72	L	1	+0 1523	5 0 31 52	+0 17	+0 04	−1 70		30 03	4 57 30 28	− 2 59 75	+13 4
					514	U	3	−0 2150	5 28 54 50	−0 26	−0 09	−1 70	0 00	52 45	5 25 47 77	− 3 4 68	
		Dec 7	*I P W*	W	δ Ursæ Minoris	L	2	+0 3368	6 8 40 17	+0 38	+0 10	+1 70		42 35	6 8 46 25	+ 0 3 90	+13 5
					51 Cephei	U	3	−0 3851	6 47 13 55	−0 46	−0 15	−1 70	+0 01	11 25	6 47 5 42	− 0 5 83	
				E	1556 Gr 72	L	4	+0 1523	5 0 33 12	+0 10	+0 02	−1 70		31 54	4 57 30 27	− 3 1 27	+ 3 3
					514	U	3	−0 2150	5 28 52 27	−0 16	−0 06	−1 70	−0 01	50 34	5 25 47 85	− 3 2 49	
		8	*I P E*	W	δ Ursæ Minoris	L	3	+0 3368	6 8 43 28	+0 23	+0 07	+1 70		45 28	6 8 46 05	+ 0 0 77	+ 1 9
					51 Cephei	U	3	−0 3851	6 47 8 47	−1 28	−0 10	−1 70	+0 01	6 40	6 47 5 77	− 0 0 63	
				E	1556 Gr 72	L	3	+0 1523	5 0 31 34	+0 99	+0 37	−1 70		31 00	4 57 30 25	− 3 0 75	+ 6 9
		„ 9	*I P W*		514	U	3	−0 2150	5 28 55 42	−1 57	−0 90	−1 70	−0 01	51 24	5 25 47 93	− 3 3 31	+ 3 4
					51 Cephei	U	2	−0 3851	6 50 14 64	−2 75	−1 46	−1 70	−0 04	8 69	6 47 6 10	− 3 2 59	
				E	1556 Gr 72	L	3	+0 1523	5 0 36 24	+0 10	+0 21	−1 70		34 85	4 57 30 23	− 3 4 62	− 7 6
					514	U	3	−0 2150	5 28 52 31	−0 16	−0 52	−1 70	−0 02	49 91	5 25 48 07	− 3 1 84	
		11	*I P E*	W	δ Ursæ Minoris	L	3	+0 3368	6 8 44 79	+0 23	+0 57	+1 70		47 29	6 8 45 51	− 0 1 78	− 8 8
					51 Cephei	U	3	−0 3851	6 47 4 98	−0 28	−0 84	−1 70	0 00	2 16	6 47 6 ,0	+ 0 4 54	
				E	1556 Gr 72	L	4	+0 1523	5 0 36 02	+0 99	+0 20	−1 70		35 51	4 57 30 22	− 3 5 29	− 5 6
					514	U	3	−0 2150	5 28 55 15	−1 57	−0 50	−1 0	−0 02	51 36	5 25 48 13	− 3 3 23	
		12	*I P W*	W	δ Ursæ Minoris	L	3	+0 3368	6 8 42 02	+2 26	+0 56	+1 70		46 54	6 8 45 37	− 0 1 17	− 6 8
				—	51 Cephei	U	3	−0 3851	6 47 8 49	−2 75	−0 82	−1 70	+0 01	3 23	6 47 6 96	+ 0 3 73	
				E	1556 Gr 72	L	4	+0 1523	5 0 37 87	+0 10	+0 24	−1 70		36 51	4 57 30 21	− 3 6 30	− 4 6
				„	514	U	3	−0 2150	5 28 55 27	−0 16	−0 59	−1 70	−0 02	52 80	5 25 48 20	− 3 4 60	
		18	*I P E*	W	δ Ursæ Minoris	L	3	+0 3368	6 8 43 25	+0 23	+0 66	+1 70		45 84	6 8 45 24	− 0 0 60	− 7 1
					51 Cephei	U	3	−0 3851	6 47 5 62	−0 28	−0 97	−1 70	+0 01	2 68	6 47 7 19	+ 0 4 51	

A	St t	A D t	Int I t	C k n	Star	C l	No f W	D v t (t t A	Ol rv d Ti e of T it	C t f — C ll t	L v l	I F l t r Q	App t Cl k R t	S l f C t d T f Tr t	R lt A o (In g d by l f Low C l n t o)	Apparent Clock Correction	D d d V l f D t n C t
AGPA (F) D AVIT AR (W)	AC1A (L t t)	188							h						l m	m	l
			I I I	I	14 Gr 72	U	5	−0 54	5 4(33	−0 88	−0	+ 5)	−0	46 (8	5 5 48 48	+ 0 1 80	−1 0
			I I I		δ U M r	I	3	4)	6 8 43 23	+1 (	+0 3)	− 59		43 29	6 8 44 5	+ 0 1 22	−3 2
		D 1	I I I		1 C [l 1	I		−0 4 25	6 47 8)3	− 4	−0 5(	− 59	0	5 24	6 47 8 87	+ 3 6	
			I P W	W	λ U M	I		+)	7 4 9 25	−2 2	+0 44	−1 8		5)9	7 37 2)5	+12 46 9(	−10 0
			I I W		73 G /	U		−1 (	7 30 0 ,1	+2 12	−0 47	−1 58	+0 02	8	7 43 0 04	+13 9 24	
			I P W	I	14 G	U	5	− 2 54	5 44 3	− 35	− 7	+1 58		4 47	5 25 48 48	+ 0 3	−(2
			I I W		δ U M	I	3	+0 34)	6 8 45)	+ 5	+ 08	− 58	+0 2	44 93	(8 44 4	− 0 0 5	
			I I F	W	λ	I		+)	7 24 3 88	+ 36	+ 3	− 9		3)(	37 2 0	+ 48 4	−8 9
			I I I		3 G 7	U		− (	7 3 6 9	− 3	−1 4	− 5)	+	2 4	7 43 10 ,0	+ 3 7)(	
			I P F	I	14 G	U	5	− 2 54	5 25 43 09	−0 08	− 7	+ (		44 44	5 25 48 49	+ 0 4 5	−8
		3	I I I		δ U M	I	3	+ 34)	(8 4(5	+	+0 9	− (	+0 3	4 4	(8 44 29	− 0 0)	
			I I W	W	λ	I		)	, 4 94	+ (1	+0	− (0		8 0	37 2)	+ 2 53 2)	−9 2
			I I W		3 G	U		− (	, 2) (8	− 62	−0 (	− 6	+0	57 54	43 36	+ 3 3 8	
			I I W	I	14 G	U	5	− 254	5 42 15	−0 35	−0 3	+1 59		43 2(	5 2 48 50	+ 0 5 24	−) 2
		5	I P W		δ U M o s	I		+ 34)	(8 45 3	+0 50	+0 14	− 59	+ 4	44 2	6 8 44 19	− 0 0 03	
			I P I	W	λ	I	2	+)	4 5 4	+0 3(	+0 44	− 5)		4 3	7 37 0 53	+12 5(8	−5 9
			I I I		3 G 2	U		−1 (	7 30 5 3	− 37	− 4,	− 5)	+0	7	7 43 12 02	+ 3) 3	
			I P I	I	14 G	U	3	− 2 4	5 25 38 18	−0 35	− 30	+1 5)		9	5 2 48 49	+ 0 9 3	−) 4
			I I F		δ U M oi	I	3	+ 4)	(8 4 8	+0 5	+ 33	− 5)	+	4 (	6 8 44 13	+ 0 3)	
			I I F		1 C [l	U	3	− 4 5	(47 5 7	− 14	− 4	− 5)	+ 4	3	(47 9 85	+ 0 (84	−5
		6	I I W	W		U	3	− 4 8	(34 2 (8	+0 9	−0 (3	+1 9		4 43	6 47 9 8	+13 5 42	
			I I W		λ U M s	I		+)	3 53 (	−2	+ 48	− 5)	+	4)	3(59 27	+ 3 8	+1 5
			I I W		3 G	U	2	− (	7 3 4 53	+2 2	−1 59	−1 59	+0	3 48	7 43 3 4	+ 3 9 ,(	−0 9
			I I W	F	51 4 C	U	3	−0 2 4	5 25 35 45	+0 4	+0 48	+1 (4		38 02	5 25 48 47	+ 0 10 45	−9 8
		7	I I W		δ U u M rs	I	3	0 34)	6 8 42 09	−0 (	− 3	−1 (4	+0 0(	) 33	6 8 44 2	+ 0 4)	
			I I I	W	λ	I		)	24)5	+4)	− (	−1 64		4 24	7 36 58 77	+ 2 54 5	−17 2
			I I L		73 Gr 72	U		− 0 6	7 29 4((	−4	+0 8	− 64	+ 0	4 03	7 43 3 8	+13 32 8	
			I P I	F	51 4 G	I	3	− 4	5 25 35 63	−0 88	−0 23	+1 63		36 15	5 5 48 45	+ 0 12 3	−7
		8	I I F		δ U u M	I	3	+ 34)3	6 8 3(3	+ (	+	− 63	+ 0(	3(24	6 8 44 3	+ 0 7 8)	
			I I W	W	λ	L	2	+ 1)	7 24 ( )	− 2	−0 ((	− (3		3 28	7 36 58 33	+ 2 55 5	−18 8
			I I W		3 G 2	L		− (	7) 3(3	+2 1	+	− 63	+0	3 54	43 14 38	+ 3 36 84	
			I I W	F	14 G 7	U	3	−0 22 4	5 25 33 2	−0 88	−0 (	+1 61		34 39	5 25 48 44	+ 0 14 0	−7 5
		29	I P W		δ U u Mi ors	L	3	+0 34)3	6 8 34 (5	+1 6	+0 6	−1 6	+0 06	34 42	6 8 44 13	+ 0 9 7	
			I I F	W	λ	L	2	+ 9	7 24 (5)	− 1	−0 (	− (3		2 24	7 36 57 8)	+12 55 65	−22 7
			I P I		3 (72	U		− 0 (	9 2 5	+2 12	+0 (5	−1 (3	+0 01	28 90	7 43 14 95	+13 46 05	

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
AGRA (E) AND AMRITSAR (W)	AMRITSAR (Latitude 31 38)	1885							h m s	s	s	s	s	s	h m s	m s	d
				E	δ Ursæ Minoris	L	3	+0 3322	6 21 25 64	−0 45	−0 32	−1 87		23 00	6 8 44 51	−12 38 49	−15 4
					51 Cephei	U	1	−0 3789	6 59 37 24	+0 55	+0 47	−1 87	0 00	36 39	6 47 8 87	−12 27 52	
		Dec 21	*I P E*	W		U	3	−0 3789	6 46 39 70	+0 55	+0 47	+1 87	−0 08	42 51	6 47 8 87	+ 0 26 36	−18 9
					λ Ursæ Minoris	L	2	+1 0589	7 37 8 18	−1 48	−1 13	−1 87		3 70	7 37 2 95	− 0 0 75	−22 2
					735 Gr 72	U	2	−1 0386	7 42 23 47	+1 50	+1 20	−1 87	+0 02	24 32	7 43 10 04	+ 0 45 72	
				E	514 Gr 72	U	3	−0 2112	5 38 21 53	−2 19	−0 87	+1 90	−0 02	20 35	5 25 48 48	−12 31 87	−7 5
					δ Ursæ Minoris	L	3	+0 3322	6 21 20 17	+1 06	+1 00	−1 90		20 33	6 8 44 40	−12 35 93	−7 4
					51 Cephei	U	3	−0 3789	6 59 42 52	−1 29	−1 46	0 00	+0 02	39 79	6 47 9 12	−12 30 67	
		22	*I P W*	W		U	2	−0 3789	6 46 48 02	−1 29	−1 46	0 00	−0 08	45 19	6 47 9 12	+ 0 23 93	−9 1
					λ Ursæ Minoris	L	2	+1 0589	7 36 44 36	+3 46	+3 51	0 00		51 33	7 37 2 10	+ 0 10 77	−13 5
					735 Gr 72	U	2	−1 0386	7 42 38 70	−3 50	−3 73	0 00	+0 02	31 49	7 43 10 70	+ 0 39 21	
				E	δ Ursæ Minoris	L	3	+0 3322	6 21 19 79	−0 45	−0 20	−2 11		17 03	6 8 44 29	−12 32 74	−1 0
					51 Cephei	U	3	−0 3789	6 59 42 64	+0 55	+0 28	−2 11	+0 03	41 39	6 47 9 36	−12 32 03	
		23	*I P E*	W	λ Ursæ Minoris	L	2	+1 0589	7 36 44 18	−1 48	−0 69	−3 11		39 90	7 37 1 29	+ 0 21 39	−4 5
					735 Gr 72	U	1	−1 0386	7 42 40 30	+1 50	+0 73	−2 11	+0 02	40 44	7 43 11 36	+ 0 30 92	
				E	514 Gr 72	U	3	−0 2112	5 38 18 29	−0 73	−0 80	+2 11	−0 04	18 83	5 25 48 50	−12 30 33	−1 2
					δ Ursæ Minoris	L	3	+0 3322	6 21 15 29	+1 06	+0 91	−2 11		15 15	6 8 44 19	−12 30 96	−2 1
					51 Cephei	U	4	−0 3789	6 59 43 78	−1 29	−1 32	−2 11	+0 03	39 09	6 47 9 56	−12 39 53	
		24	*I P W*	W		U	3	−0 3789	6 46 42 57	−1 29	−1 32	+2 10	−0 08	41 98	6 47 9 56	+ 0 27 58	−2 4
					λ Ursæ Minoris	L	2	+1 0589	7 36 31 77	+3 46	+3 20	−2 10		36 33	7 37 0 53	+ 0 24 20	−5 0
					735 Gr 72	U	2	−1 0386	7 42 46 37	−3 50	−3 40	−2 10	+0 02	37 39	7 43 12 02	+ 0 34 63	
				E	514 Gr 72	U	4	−0 2112	5 37 48 37	+0 31	+0 08	+2 10	−0 04	50 82	5 25 48 49	−12 2 33	−126 4
				,	δ Ursæ Minoris	L	3	+0 3322	6 21 57 80	−0 45	−0 09	−2 10		55 16	6 8 44 13	−13 11 03	−127 8
		26	*I P E*		51 Cephei	U	2	−0 3789	6 58 49 31	+0 55	+0 13	0 00	+0 03	50 02	6 47 9 85	−11 40 17	
				W	λ Ursæ Minoris	L	2	+1 0589	7 36 30 37	−1 48	−0 31	0 00		28 58	7 36 59 27	+ 0 30 69	−3 7
					735 Gr 72	U	2	−1 0386	7 42 32 96	+1 50	+0 33	0 00	+0 02	34 81	7 43 13 24	+ 0 38 43	
				E	514 Gr 72	U	5	−0 2112	5 38 13 82	−0 73	−0 30	0 00	−0 04	12 75	5 25 48 47	−12 24 28	−10 2
					δ Ursæ Minoris	L	3	+0 3322	6 21 12 53	+1 06	+0 34	0 00		13 93	6 8 44 12	−12 29 81	−10 2
					51 Cephei	U	3	−0 3789	6 59 34 22	−1 29	−0 49	0 00	+0 03	32 47	6 47 9 93	−12 22 54	
		27	*I P W*	W		U	3	−0 3789	6 46 34 75	−1 29	−0 49	0 00	−0 08	32 89	6 47 9 93	+ 0 37 04	−11 1
					λ Ursæ Minoris	L	2	+1 0589	7 36 32 90	+3 46	+1 19	0 00		37 55	7 36 58 77	+ 0 21 22	−15 8
					735 Gr 72	U	2	−1 0386	7 42 24 22	−3 50	−1 27	0 00	+0 02	19 47	7 43 13 81	+ 0 54 34	

A	St t on	A tro omi al Date	I t um ntal Po t on	Clo k n u e	Star	C lm t n	f W e Ot	D t t (t t A	Obs rv l T of T t	C ll t	L vel	I F l a t Q	App Cl k R t	ı of Co f T T t d	R lt A n (I d by 12 lo f Low Culmin t n)	App nt Clo k Co ct ns	D d d V l of D t on Corr t on
		1885							*h m*			*s*	*s*		*h m s*	*m*	*d*
AGRA (E) AND AMRITSAR (W)	AMRITSAR (L t 8)			L	51 k G 72	U	5	–	5 38 2 12	+0 3	– 53	0 00		11 90	5 25 48 45	–12 23 45	– 6 6
		D 8	*I P E*		δ Ur ae M	L	3	+0 332	6 21 12 97	–0 45	+ 61	–2 1	+0 06	1 08	6 8 44 13	–12 26 9	
				W	λ	L	2	+1 0 8	7 36 29 17	–1 48	+2 14	0		2 83	7 36 58 33	+ 0 28 5	–10 9
					3 Gr 7	U	2	– 0386	7 42 23 6	+ 5	– 6		+0	22 9	7 43 14 38	+ 0 51 43	
				E	51 k G 7	U	4	–0 21 2	5 8 20	–0 3	– 37	+2		0 2	5 25 48 44	–12 21 6	+ 1 0
					δ U a M o s	I	3	+ 33	6 5 9	+ 06	+0 43	–2 1	+0 06	5 37	6 8 44 13	–12 2 24	
		9	*I P W*	W	λ	L		+ 055	7 36 1 30	+3 46	+ 5	–2 1		17	7 36 57 8	+ 35 72	– 7 5
					3 G 72	U	2	– 386	42 30 59	–3 50	– 6	–2	+0 2	3 4	7 43 4 95	+ 0 51 54	
AMRITSAR (E) AND MOOLTAN (W)	AMRITSAR (Lat t 1 3 8)	1886		J	δ U ae M	I	3	+0 33	6 7 8 30	+1 10	+0 5	0 0		9	6 8 44 07	+ 1 24	– 7
					1 C j l	U	3	– 3	6 45 43 5	– 43	– 83		+0 1	4 66	6 47 84	+ 1 2 8	
		J	*I I W*	W	λ U ae M	I	2	+ 5 0	7 23 3 24	+3 8	+2 0	–1 4		3	36 54 4	+ 3 3	–13
					3 G	I	2	– 406	7 29 20 9	–3 83	–2 3	– 74	–	3 28	7 43 85	+14 4 5	
				E	δ U ae M no s	I	3	+0 33 0	6 7 5 87	–0 53	–0 4	+ 5		6 95	6 8 44	+ 27 14	–17 2
					1 C j l 1	U	3	– 3 9	6 45 3 35	+0 69	+ 2	– 5	+0 0	5	6 47 94	+ 39 35	
		6	*I P I*	W	λ U a M no s	I		+ 5	7 23 30 53	–1 8	– 50	–1 3		26 4	7 6 53 7	+ 3 27 2	– 8 1
					3 G 72	U		– 04 6	7 2 1 86	+ 86	+0 53	– 73	–0	5	7 43 18 4	+14 5 6	
				E	δ Ur ae M noris	I	3	+0 332	6 7 0 59	–0 53	–0 0	+ 2		1 73	6 8 44 26	+ 1 42 53	– 3 9
					1 C j l	U	3	– 3 9	6 45 26 6	+0 69	+0 8	–1	+0 6	2 2	6 47 1 02	+ 1 45 3	
		9	*I P E*	W	λ Ur M or	I		+ 05	7 23 8 6	– 85	– 9	– 7		5 0	7 36 5 9	+13 37 8	– 7 3
					3 Gr 72	U	2	– 0406	7 2 25 51	+1 86	+0 20	–1	–0 0	25 85	7 43 9 00	+13 53 15	
				E	δ U a M o s	L	2	+0 332	6 6 59 46	+1	–0 13	+1 7		62 4	6 8 44 35	+ 1 42 21	–10 5
					1 C j h	U	3	–0 3	6 45 24 23	–1 43	+0 18	–1	+0 06	2 33	6 47 1 0	+ 1 49 68	
		10	*I P W*	W	λ U Mi o s	I	2	+1 05 0	7 23 25 77	+3 80	–0 44	–1 71		2 42	7 36 52 68	+13 25 6	–20 2
					3 G 72	U	2	–1 406	7 29 16 2	–3 83	+0 4	–1	–0 02	63	7 43 19 29	+14 7 66	
				E	δ U M o is	I	3	+ 33	6 6 56 9	+1 10	–0 18	+ 2		5 43	6 8 44 57	+ 1 45 14	– 4 4
					51 C j hei	U	3	–0 3	6 45 18 41	–1 43	+0 26	–1 72	+0 06	5 58	6 47 0 98	+ 1 55 4	
		1	*I P W*	W	λ Urs M noris	L	2	+1	7 23 31 97	+3 80	–0 63	– 73		33 41	7 36 52 41	+13 9 00	–16 6
					3 (2	U	2	–1 04 6	7 29 30 66	–3 83	+ 67	–1 3	–0 02	5 5	7 43 9 64	+13 53 8	
				E	δ Ursae M no	I	3	+0 332	6 6 5 58	+1 34	+1 09	+1 6		55 77	6 8 44 9	+ 1 49 02	–14 2
		14	*I P E*		51 C j l 1	U	2	–0 3	6 4 16 63	–1 61	–1 59	– 6	+0 06	3	6 47 10 8	+ 1 59 09	
				E	δ U sae M no 1	L	3	+ 33	6 6 4 68	+ 34	+2 36	+1 41		45	6 8 45 24	+ 1 59 45	–20 9
					1 C j l 1	U	3	–0 3 9	6 44 62 8	– 6	–3 45	–1 41	+ 6	56 46	6 47 10 74	+ 2 14 28	
		19	*I P E*	W	λ U sa M nor s	L	2	+ 57	7 23 48 05	+4 29	+8 2	– 4		59 18	7 36 51 36	+12 52 18	–2 9
					3 G 72	U	2	–1 0406	7 29 44 3	–4 33	–8 8	– 4	–0 0	29 47	4 20 9	+13 50 82	

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
		1886							h m s	s	s	s	s	s	h m s	m s	d
AMRITSAR (E) AND MOOLTAN (W)	MOOLTAN (Latitude 30 11′)			E	δ Ursæ Minoris	L	3	+0 3405	6 21 5 27	+0 15	−0 09	0 00		5 33	6 8 44 07	−12 21 26	−10 3
		Jan 5	*I P W*		51 Cephei	U	3	−0 3903	6 59 24 46	−0 19	+0 13	0 00	+0 17	24 57	6 47 10 84	−12 13 73	
				W	λ Ursæ Minoris	L	2	+1 0855	7 37 8 96	+0 50	−0 30	0 00		9 16	7 36 54 42	− 0 14 74	−17 1
					735 Gr 72	U	2	−1 0700	7 42 55 98	−0 50	+0 33	0 00	−0 01	55 80	7 43 17 85	+ 0 22 05	
				E	δ Ursæ Minoris	L	3	+0 3405	6 20 58 42	+0 15	+0 07	0 00		58 64	6 8 44 09	−12 14 55	− 7 4
		, 6	*I P W*		51 Cephei	U	3	−0 3903	6 59 21 94	−0 19	−0 10	−1 67	+0 09	20 07	6 47 10 94	−12 9 13	
				W	λ Ursæ Minoris	L	1	+1 0855	7 37 14 86	+0 50	+0 24	−1 69		13 91	7 36 53 97	− 0 19 94	−17 8
					735 Gr 72	U	1	−1 0700	7 42 62 19	−0 50	−0 26	−1 69	−0 01	59 73	7 43 18 14	+ 0 18 41	
				E	δ Ursæ Minoris	L	3	+0 3405	6 20 45 34	+0 46	+0 21	+1 62		47 63	6 8 44 26	−12 3 37	− 7 7
		, 9	*I P E*		51 Cephei	U	3	−0 3903	6 59 11 18	−0 56	−0 31	−1 62	+0 06	8 75	6 47 11 02	−11 57 73	
				W	λ Ursæ Minoris	L	2	+1 0855	7 37 7 07	+1 49	+0 73	−1 67		7 62	7 36 52 90	− 0 14 72	−11 8
					735 Gr 72	U	2	−1 0700	7 43 12 14	−1 50	−0 78	−1 67	−0 01	8 18	7 43 19 00	+ 0 10 82	
				E	δ Ursæ Minoris	L	3	+0 3405	6 20 43 27	+0 46	+0 31	+1 63		45 67	6 8 44 35	−12 1 32	− 7 4
		" 10	*I P E*		51 Cephei	U	3	−0 3903	6 59 9 52	−0 56	−0 46	−1 63	+0 06	6 93	6 47 11 01	−11 55 92	
				W	λ Ursæ Minoris	L	2	+1 0855	7 37 2 76	+1 49	+1 09	−1 67		3 67	7 36 52 68	− 0 10 99	− 8 8
					735 Gr 72	U	2	−1 0700	7 43 15 59	−1 50	−1 17	−1 67	−0 02	11 23	7 43 19 29	+ 0 8 06	
				E	δ Ursæ Minoris	L	3	+0 3405	6 20 39 34	+0 15	−0 19	+1 67		40 97	6 8 44 57	−11 56 40	− 4 6
		12	*I P W*		51 Cephei	U	3	−0 3903	6 59 5 49	−0 19	+0 28	−1 67	+0 06	3 97	6 47 10 93	−11 53 04	
				W	λ Ursæ Minoris	L	2	+1 0855	7 37 10 38	+0 50	−0 67	−1 67		8 54	7 36 52 41	− 0 16 13	− 8 6
					735 Gr 72	U	1	−1 0700	7 43 18 60	−0 50	+0 72	−1 67	−0 02	17 13	7 43 19 64	+ 0 2 51	
				E	δ Ursæ Minoris	L	3	+0 3405	6 20 30 98	+0 54	+0 16	+1 72		33 40	6 8 44 79	−11 48 61	+ 0 3
		, 14	*I P W*		51 Cephei	U	3	−0 3903	6 58 62 17	−0 65	−0 23	−1 72	+0 06	59 63	6 47 10 82	−11 48 81	
				W	λ Ursæ Minoris	L	2	+1 0855	7 37 11 80	+1 74	+0 54	−1 71		12 37	7 36 52 23	− 0 20 14	− 5 3
					735 Gr 72	U	2	−1 0700	7 43 32 65	−1 75	−0 59	−1 71	−0 02	28 58	7 43 19 98	− 0 8 60	
				E	δ Ursæ Minoris	L	3	+0 3405	6 20 27 11	+0 08	+0 38	+1 87		29 44	6 8 45 24	−11 44 20	−11 8
		19	*I P E*	,	51 Cephei	U	2	−0 3903	6 58 48 76	−0 09	−0 56	−1 87	+0 06	46 30	6 47 10 74	−11 35 56	
				W	λ Ursæ Minoris	L	2	+1 0855	7 37 32 31	+0 25	+1 33	−1 88		32 01	7 36 51 36	− 0 40 65	−15 1
			—		735 Gr 72	U	2	−1 0700	7 43 31 91	−0 25	−1 43	−1 88	−0 02	28 33	7 43 20 29	− 0 8 04	
MOOLTAN (E) AND KARACHI (W)	MOOLTAN (Latitude 30 11′)	1886		E	δ Ursæ Minoris	L	3	+0 3363	6 9 11 34	−0 11	+0 19	+1 71		13 13	6 8 46 64	− 0 26 49	− 4 5
		Jan 27	*I P E*		51 Cephei	U	3	−0 3858	6 47 34 73	+0 13	−0 28	−1 71	+0 13	33 00	6 47 9 73	− 0 23 27	
				W	λ Ursæ Minoris	L	2	+1 0710	7 19 23 07	−0 37	+0 66	+1 70		25 06	7 36 52 09	+17 27 03	− 7 9
				"	735 Gr 72	U	2	−1 0586	7 25 34 22	+0 37	−0 70	+1 70	−0 01	35 58	7 43 19 44	+17 43 86	

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
		1886							h m s	s	s	s	s	s	h m s	m s	d
MOOLTAN (E) AND KARACHI (W)	MOOLTAN (Latitude 30 11')	Jan 28	*I P W*	E	δ Ursæ Minoris	L	2	+0 3363	6 9 12 43	+0 71	+0 10	+1 62		14 86	6 8 46 83	− 0 28 03	−25 4
					51 Cephei	U	3	−0 3858	6 47 20 10	−0 84	−0 15	0 00	+0 13	19 24	6 47 9 58	− 0 9 66	
				W	λ Ursæ Minoris	L	1	+1 0710	7 19 46 56	+2 34	+0 36	+1 62		50 88	7 36 52 28	+17 1 40	−30 1
					735 Gr 72	U	2	−1 0586	7 25 14 81	−2 35	−0 38	+1 62	−0 01	13 69	7 43 19 19	+18 5 50	
		29	*I P W*	E	δ Ursæ Minoris	L	3	+0 3363	6 8 59 13	+0 71	−0 12	+1 55		61 27	6 8 47 00	− 0 14 27	+ 0 1
					51 Cephei	U	3	−0 3858	6 47 25 88	−0 84	+0 18	−1 55	+0 13	23 80	6 47 9 45	− 0 14 35	
				W	λ Ursæ Minoris	L	1	+1 0710	7 19 19 32	+2 34	−0 42	+1 53		22 77	7 36 52 43	+17 29 66	− 3 9
					735 Gr 72	U	2	−1 0586	7 25 41 47	−2 35	+0 45	+1 53	−0 01	41 09	7 43 18 93	+17 37 84	
		31	*I P E*	E	δ Ursæ Minoris	L	2	+0 3363	6 8 52 89	−0 11	+0 73	+1 40		54 91	6 8 47 33	− 0 7 58	− 6 3
					51 Cephei	U	3	−0 3858	6 47 14 46	+0 13	−1 08	−1 40	+0 13	12 24	6 47 9 22	− 0 3 02	
				W	λ Ursæ Minoris	L	2	+1 0710	7 19 24 40	−0 37	+2 57	+1 40		28 00	7 36 52 66	+17 24 66	− 6 1
					735 Gr 72	U	2	−1 0586	7 25 41 67	+0 37	−2 75	+1 40	+0 01	40 70	7 43 18 42	+17 37 72	
		Feb 2	*I P E*	E	δ Ursæ Minoris	L	3	+0 3363	6 8 41 12	+1 77	+0 56	+1 38		44 83	6 8 47 71	+ 0 2 88	− 7 7
					51 Cephei	U	3	−0 3858	6 47 4 66	−2 09	−0 83	−1 38	+0 15	0 51	6 47 8 95	+ 0 8 44	
				W	λ Ursæ Minoris	L	2	+1 0710	7 19 22 61	+5 78	+1 97	+1 38		31 74	7 36 52 94	+17 21 20	−10 8
					735 Gr 72	U	2	−1 0586	7 25 39 98	−5 81	−2 11	+1 38	0 00	33 44	7 43 17 73	+17 44 29	
		3	*I P W*	E	δ Ursæ Minoris	L	2	+0 3363	6 8 34 98	+0 71	+0 32	+2 00		38 01	6 8 47 92	+ 0 9 91	− 0 8
					51 Cephei	U	3	−0 3858	6 46 61 44	−0 84	−0 48	−2 00	+0 15	58 27	6 47 8 78	+ 0 10 51	
				W	λ Ursæ Minoris	L	2	+1 0710	7 19 15 78	+2 34	+1 13	+2 00		21 25	7 36 53 15	+17 31 90	− 3 4
					735 Gr 72	U	2	−1 0586	7 25 46 34	−2 35	−1 22	+2 00	0 00	44 77	7 43 17 39	+17 32 62	
	KARACHI (Latitud 24 51')	1886															
		Jan 27	*I P E*	E	δ Ursæ Minoris	L	2	+0 3549	6 27 6 46	−0 84	−0 65	+1 68		6 65	6 8 46 64	−18 20 01	−32 2
					51 Cephei	U	3	−0 4123	7 5 4 56	+1 02	+1 02	−1 68	+0 13	5 05	6 47 9 73	−17 55 32	
				W	λ Ursæ Minoris	L	2	+1 1355	7 37 33 43	+3 47	+1 40	+1 64		39 94	7 36 52 09	− 0 47 85	−34 6
					735 Gr 72	U	2	−1 1271	7 42 52 49	−3 50	−1 53	+1 64	−0 01	49 09	7 43 19 44	+ 0 30 35	
		28	*I P E*	E	δ Ursæ Minoris	L	3	+0 3549	6 26 50 49	+1 07	+0 40	+1 67		53 63	6 8 46 83	−18 6 80	− 9 5
					51 Cephei	U	3	−0 4123	7 5 12 53	−1 30	−0 63	−1 67	+0 13	9 06	6 47 9 58	−17 59 48	
				W	λ Ursæ Minoris	L	2	+1 1355	7 37 9 28	+3 47	+1 45	+1 66		15 86	7 36 52 28	− 0 23 58	−14 3
					735 Gr 72	U	2	−1 1271	7 43 13 96	−3 50	−1 59	+1 66	−0 01	10 52	7 43 19 19	+ 0 8 67	
		29	*I P W*	E	δ Ursæ Minoris	L	3	+0 3549	6 26 47 43	+1 45	+0 46	+1 65		50 99	6 8 47 00	−18 3 99	−14 4
					51 Cephei	U	3	−0 4123	7 5 6 38	−1 77	−0 72	−1 65	+0 13	2 37	6 47 9 45	−17 52 92	
				W	λ Ursæ Minoris	L	2	+1 1355	7 37 15 00	+4 71	+1 65	+1 66		23 02	7 36 52 43	− 0 30 59	−18 9
					735 Gr 72	U	2	−1 1271	7 43 11 62	−4 75	−1 81	+1 66	−0 01	6 71	7 43 18 93	+ 0 12 22	

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
MOOLTAN (E) AND KARACHI (W)	KARACHI (Latitude 24 51')	1886							h m s	s	s	s	s	s	h m s	m s	d
				E	δ Ursæ Minoris	L	3	+0 3549	6 26 37 26	+1 45	+0 31	+1 66		40 68	6 8 47 33	−17 53 35	−15 4
		Jan 31	*I P W*		51 Cephei	U	3	−0 4123	7 4 54 52	−1 77	−0 48	−1 66	+0 13	50 74	6 47 9 22	−17 41 52	
				W	λ Ursæ Minoris	L	1	+1 1355	7 37 11 66	+4 71	+1 10	+1 65		19 12	7 36 52 66	− 0 26 46	−14 9
					735 Gr 72	U	2	−1 1271	7 43 15 56	−4 75	−1 21	+1 65	+0 01	11 26	7 43 18 42	+ 0 7 16	
				E	δ Ursæ Minoris	L	3	+0 3549	6 26 22 66	+1 07	+0 22	+1 64		25 59	6 8 47 71	−17 37 88	− 1 6
		Feb 2	*I P E*		51 Cephei	U	3	−0 4123	7 4 48 73	−1 30	−0 35	−1 64	+0 15	45 59	6 47 8 95	− 7 36 64	
				W	λ Ursæ Minoris	L	2	+1 1355	7 36 58 71	+3 47	+0 80	+1 65		64 63	7 36 52 94	− 0 11 69	− 0 4
					735 Gr 72	U	2	−1 1271	7 43 31 30	−3 50	−0 88	+1 65	0 00	28 57	7 43 17 73	− 0 10 84	
				E	δ Ursæ Minoris	L	3	+0 3549	6 26 20 93	+0 30	+0 25	+1 67		23 15	6 8 47 92	−17 35 23	− 8 5
		3	*I P E*		51 Cephei	U	3	−0 4123	7 4 39 79	−0 37	−0 39	−1 6,	+0 15	37 51	6 47 8 78	−17 28 73	
				W	λ Ursæ Minoris	L	2	+1 1355	7 37 8 20	+0 99	+0 90	+1 69		1 78	7 36 53 15	− 0 18 63	− 8 8
					735 Gr 72	U	2	−1 1271	7 43 16 33	−1 00	−0 99	+1 69	0 00	16 03	7 43 17 39	+ 0 1 36	
PESHAWAR (E) AND MOOLTAN (W)	PESHAWAR (Latitude 34 0')	1886															
				E	λ Ursæ Minoris	L	2	+1 0275	7 36 46 23	−6 50	−2 80	+2 20		39 13	7 36 55 72	+ 0 16 59	+27 1
		Feb 9	*I P E*		735 Gr 72	U	2	−1 0146	7 43 41 68	+6 57	+2 99	+2 20	+0 01	53 45	7 43 14 69	− 0 38 76	
				W	1958 „	L	1	+0 145,	8 50 4 31	−0 86	−0 30	+2 20		5 35	8 50 40 38	+ 0 35 03	+30 1
					908	U	5	−0 1161	9 20 24 68	+0 83	+0 45	−2 20	−0 01	23 75	9 20 50 89	+ 0 27 14	
				E	λ Ursæ Minoris	L	1	+1 0275	7 36 44 91	+2 33	−0 53	+2 19		48 90	7 36 56 30	+ 0 7 40	+17 7
		10	*I P W*		735 Gr 72	U	1	−1 0146	7 43 42 47	−2 36	+0 57	+2 19	+0 01	42 88	7 43 14 24	− 0 28 74	
				W	1958 „	L	4	+0 1457	8 50 4 50	+0 31	−0 06	+2 17		6 92	8 50 40 40	+ 0 33 48	+21 2
					908	U	3	−0 1161	9 20 25 34	−0 30	+0 08	−2 17	+0 02	22 97	9 20 50 90	+ 0 27 93	
				E	λ Ursæ Minoris	L	3	+1 0275	7 37 8 19	+2 33	−1 80	+2 15		10 87	7 36 56 85	− 0 14 02	− 6 7
		11	*I P W*		735 Gr 72	U	2	−1 0146	7 43 13 24	−2 36	+1 92	+2 15	0 00	14 95	7 43 13 59	− 0 1 36	
				W	1958	L	4	+0 145,	8 50 7 45	+0 31	−0 19	+2 11		9 68	8 50 40 42	+ 0 30 74	− 1 2
					908	U	6	−0 1161	9 20 21 96	−0 30	+0 29	−2 11	+0 02	19 86	9 20 50 91	+ 0 31 05	
				E	λ Ursæ Minoris	L	3	+1 0275	7 37 5 55	−0 33	−3 20	+2 16		4 18	7 36 57 35	− 0 6 83	+ 3 1
		12	*I P E*		735 Gr 72	U	2	−1 0146	7 43 20 24	+0 37	+3 42	+2 16	0 00	26 19	7 43 13 03	− 0 13 16	
				W	1958 „	L	3	+0 1457	8 50 5 46	−0 05	−0 35	+2 17		7 23	8 50 40 45	+ 0 33 22	+ 8 3
					908	U	5	−0 1161	9 20 21 47	+0 05	+0 51	−2 17	+0 02	19 88	9 20 50 92	+ 0 31 04	
				E	λ Ursæ Minoris	L	3	+1 0275	7 36 48 17	−0 33	−2 13	+2 17		47 88	7 36 59·64	+ 0 11 76	+17 9
		„ 17	*I P E*	„	735 Gr 72	U	3	−1 0146	7 43 29 90	+0 37	+2 28	+2 17	+0 01	34 73	7 43 9 79	− 0 24 94	
				W	1958 „	L	5	+0 1457	8 49 58 97	−0 05	−0 23	+2 15		60 84	8 50 40·62	+ 0 39 78	+26 4
					908 „	U	7	−0 1161	9 20 19 77	+0 05	+0 34	−2 15	+0 02	18·03	9 20 50 91	+ 0 32·88	

Arc	Station	Astronomical Date	Instrumental Position	Cl k ne	Star	Culmination	No. of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pivot Equation Q	Corrections for Apparent Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction
									h m					s	h	m	d
PESHAWAR (E) AND MOOLTAN (W)	PESHAWAR (Latitude 34 0)	1886															
				E	λ Ursæ Minoris	I	3	+1 02 5	7 37 17 37	−3 80	−2 00	+2 8		13 75	7 37 0 23	−0 13 52	−0 0
		Feb 18	I P W		735 Gr 72	U	2	−1 0 4(	7 42 54 08	+3 84	+2 4	+2 8	+0 0	62 25	7 43 9 4	+0 6 8	
				W	1958	L	(	+0 45	8 50 2 50	−0 5	−0 22	+2 16		3 93	8 50 40 65	+0 36 72	−2 4
					908	U	7	−0 1 6	9 20 14 90	+0 49	+0 32	−2 16	+0 02	13 57	9 20 50 9	+0 37 34	
	MOOLTAN (Latitude 30)	1886															
				W	λ Ursæ Mino	L	2	+ 826	7 36 6 20	−1 74	−0 78	0 00	+0 03	58 7	7 36 55 72	−0 2 99	
		Feb 9	I P E		1958 G 7	I	5	+0 152	8 50 35 (8	−0 23	−0 8	+1 65	+0 01	37 03	8 50 40 38	+0 3 35	−4 3
					908	U	7	−0 244	9 20 49 92	+0 23	+0 13	−1 65		48 63	9 20 50 89	+0 2 26	+3 9
				E	λ U sæ M oris	I		8 (	7 37 3 9	− 74	− 60	+ 65		37 2	7 36 56 3	−0 40 9	−2 6
		10	I P E		73 (r 72	U		− 0, (	7 43 45 43	+ 5	0 6	+1 6	+0 01	4) 49	7 43 14 14	−0 35 3	
				W	1)8	I	5	+ 52	8 50 35 85	−0 23	− (	+1 (5		3 21	8 5 4 40	+0 3 19	+4 6
					908	U	7	−0 1244	9 20 50 29	+0 23	+0 10	−1 65	+0 2	48 99	9 20)0	+0 1 9	
				E	λ Ursæ Mino	I	3	+1 0826	7 37 47 48	−4 9(	−1 74	+1 6(		4 44	7 36 56 8	−0 45 5)	−6 (
		11	I P W		3 (2	U	2	−1 6	7 43 36 43	+5 00	+ 89	+1 66	0 00	44 98	7 43 3 59	−0 31 39	
				W	1)58	I	5	0 520	8 50 36 40	−0 67	−0 17	+1 6(		3 22	8 50 40 42	+ 3 2	+1 1
					)08	U	7	− 244	) 20 48 72	+0 64	+ 29	− ((	+ 0	48 0	9 20 50 9	+ 2 9	
				1	λ U æ M o s	L	3	082(	7 37 45 8	−1 24	−0 06	+1 62		46 3	7 36 57 35	−0 48 8	−1 5
		12	I P W		35 (	U	2	− 072(	7 43 34 0	+ 5	+0 07	+1 6	0 00	37 4	7 43 3 3	− 24 0	
				W	1)8	I	5	+0 152	8 50 35 6	−0 16	− 1	+1 (2		37 2	8 50 40 45	+0 3 24	−4 9
					908	U	7	−0 244	9 20 4, ,7	+0 16	+0 01	−1 62	+0 0	46 34	9 20 50 92	+0 4 58	
				F	λ U M	L	3	+1 8 6	7 37 33 89	− 74	−1 26	+1 6		32 50	7 36 59 64	−0 32 86	+0 4
		17	I P E		3 Gr 7	U	3	− 0 26	7 43 38 82	+ 7	+1 37	+1 61	+0 0	43 56	43 9 9	−0 33	
				W	1958	L	4	1520	8 50 30 46	−0 23	−0 12	+1 62		31 73	8 50 40 62	+0 8 89	+6 9
					)08	U	7	− 44	9 2 45	+0 3	+0 2	− (	+ 2	43 94	9 20 50 9	+ 6 97	
				E	λ Ursæ Minor	I	3	+1 0826	7 37 27 0	+0 4	+ 42	+1 60		9 83	7 3 0 23	− 29 6	+2 3
		18	I P W		35 C 72	U	3	−1 0 26	43 43 24	−0 7	−0 46	+1 60	+0	43 64	7 43 9 14	−0 34 5	
				W	1958	L	5	+0 52	8 50 28 47	+0 0	+0 04	+ 60		3 21	8 5 40 (	+ 0 44	+6 5
					908	U	7	−0 1244	9 20 44	−0 10	−0 07	− 60	+0 0	42 27	9 0 5 91	+ 8 64	

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
AMRITSAR (E) AND PESHAWAR (W)	AMRITSAR (Latitude 31 38)	1886							h m s	s	s	s	s	s	h m s	m s	d
		Feb 24	I P W	E	815 Gr, 72	U	4	−0 2297	8 21 20 18	−0 43	−0 20	+1 66		21 21	8 21 41 74	+ 0 20 53	+ 3 7
				,	1958	L	5	+0 1583	8 50 20 30	+0 25	+0 08	−1 66	+0 07	19 04	8 50 40 96	+ 0 21 92	+ 9 7
					2017 ,	L	5	+0 1210	9 27 40 14	+0 20	+0 06	+1 65	+0 16	42 21	9 28 6 14	+ 0 23 93	
		Mar 4	I P E	E	815 Gr 72	U	5	−0 2297	8 19 50 47	−0 03	−0 12	+1 64		51 96	8 21 40 57	+ 1 48 61	+ 9 1
					1958 ,	L	5	+0 1503	8 48 50 94	+0 02	+0 05	−1 64	+0 07	49 44	8 50 41 52	+ 1 52 08	
				W	908	U	6	−0 1219	9 7 38 20	−0 02	−0 07	+1 63		39 74	9 20 50 43	+13 10 69	+23 9
					2017	L	5	+0 1210	9 14 48 25	+0 01	+0 04	+1 63	0 00	49 93	9 28 6 45	+13 16 52	
		11	I P E	E	908 Gr 72	U	7	−0 1219	9 20 51 74	−0 18	−0 13	+1 66		53 09	9 20 49 99	− 0 3 10	+29 1
					2017	L	7	+0 1210	9 28 1 01	+0 15	+0 07	+1 66	0 00	2 89	9 28 6 85	+ 0 3 96	
				W	1002	U	7	−0 1097	10 19 1 84	−0 15	−0 14	+1 64		3 21	10 32 17 00	+13 13 79	+15 2
					2164 ,,	L	5	+0 1867	10 41 53 48	+0 22	+0 12	−1 64	0 00	52 18	10 55 10 47	+13 18 29	
		, 18	I P W	E	908 Gr 72	U	7	−0 1219	9 20 47 42	−0 24	−0 15	+1 66		48 69	9 20 49 83	+ 0 1 14	+ 7 7
					2017	L	7	+0 1210	9 28 2 02	+0 20	+0 08	+1 66	0 00	3 96	9 28 6 98	+ 0 3 02	
				W	1002	U	7	−0 1097	10 18 58 83	−0 21	−0 14	+1 66		60 14	10 32 16 93	+13 16 79	− 8 4
					2164	L	6	+0 1867	10 41 57 45	+0 30	+0 14	−1 66	0 00	56 23	10 55 10 54	+13 14 31	
		, 19	I P W	E	908 Gr 72	U	7	−0 1219	9 20 35 86	+0 08	+0 09	+1 66		37 69	9 20 49 33	+ 0 11 64	−30 8
					2017	L	7	+0 1210	9 28 1 73	−0 07	−0 05	+1 66	0 00	3 27	9 28 7 42	+ 0 4 15	
				W	1002	U	7	−0 1097	10 18 56 79	+0 07	+0 08	+1 66		58 69	10 32 16 71	+13 18 11	−43 6
					2164	L	6	+0 1867	10 42 7 43	−0 10	−0 08	−1 66	0 00	5 59	10 55 10 81	+13 5 22	
		20	I P E	E	908 Gr 72	U	7	−0 1219	9 20 39 64	+0 14	+0 02	+1 66		41 42	9 20 49 24	+ 0 7 82	+ 4 6
					2017	L	6	+0 1210	9 27 57 01	−0 12	+0 01	+1 66	0 00	58 56	9 28 7 49	+ 0 8 93	
				W	1002	U	7	−0 1097	10 19 1 35	+0 13	−0 02	+1 67		3 13	10 32 16 67	+13 13 54	− 9 8
					2164	L	6	+0 1867	10 42 2 05	−0 18	+0 02	−1 67	0 00	0 22	10 55 10 86	+13 10 64	
	PESHAWAR (Latitude 34 0)	1886															
		Feb 24	I P W	E	815 Gr 72	U	3	−0 2199	8 34 31 92	−0 37	+0 32	+2 19		34 06	8 21 41 74	−12 52 32	− 6 9
					1958	L	3	+0 1457	9 3 37 88	+0 21	−0 14	−2 19	+0 0,	35 83	8 50 40 96	−12 54 87	
				W	908 ,	U	5	−0 1162	9 20 50 96	−0 20	+0 19	+2 19		53 14	9 20 50 78	− 0 2 36	+ 6 9
				,	2017	L	4	+0 1175	9 28 4 62	+0 17	−0 10	+2 19	0 00	6 88	9 28 6 14	− 0 0 74	
		Mar 4	I P W	E	815 Gr 72	U	4	−0 2199	8 34 3 58	−0 37	+0 14	+2 19		5 54	8 21 40 57	−12 24 97	− 5 1
				,	1958	L	4	+0 1457	9 3 10 31	+0 21	−0 06	−2 19	+0 07	8 34	8 50 41 52	−12 26 82	
				W	908 ,,	U	6	−0 1162	9 20 52 13	−0 20	+0 09	+2 19		54 21	9 20 50 43	− 0 3 78	+10 5
				,,	2017	L	4	+0 1175	9 28 5 45	+0 17	−0 04	+2 19	0 00	7 77	9 28 6 45	− 0 1 32	

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
AMRITSAR (E) AND PESHAWAR (W)	PESHAWAR (Latitude 34 0)	1886							h m s	s	s	s	s		h m s	m s	d
				E	908 Gr 72	U	8	−0 1162	9 34 5 50	−0 05	−0 02	+2 19		7 62	9 20 49 99	−13 17 63	+12 1
		Mar 11	*I P E*		2017	L	5	+0 1175	9 41 19 40	+0 04	+0 1	+2 19	0 00	21 64	9 28 6 85	−13 14 79	
				W	1002	U	5	−0 1044	10 32 15 20	−0 04	−0 02	+2 19		17 33	10 32 17 00	− 0 0 33	− 2 4
					2164	L	5	+0 1807	10 55 13 59	+0 06	+0 02	−2 19	0 00	11 48	10 55 10 47	− 0 1 01	
				W	908 Gr 72	U	3	−0 1162	9 20 51 40	−0 05	+0 17	+2 60	−0 01	54 11	9 20 49 83	− 0 4 28	
		18	*I P E*		1002	U	5	−0 1044	10 32 15 80	−0 04	+0 16	+2 60		18 52	10 32 16 93	− 0 1 59	+18 1
					2164	L	5	+0 1807	10 55 12 14	+0 06	−0 15	−2 60	0 00	9 45	10 55 10 54	+ 0 1 09	+ 9 4
				E	908 Gr 72	U	6	−0 1162	9 33 57 48	−0 20	+0 12	+2 64		60 04	9 0 49 33	−13 10 71	+20 3
		19	*I P W*		2017	L	6	+0 1175	9 41 10 64	+0 17	−0 06	+2 64	0 00	13 39	9 28 7 42	−13 5 9,	
				W	1002	U	5	−0 1044	10 32 17 97	−0 18	+0 11	+2 63		20 53	10 32 16 7	− 0 3 82	+ 7 3
					2164	L	5	+0 1807	10 55 15 01	+0 27	−0 10	−2 63	−0 01	12 54	10 55 10 81	− 0 1 ,3	
				E	908 Gr 72	U	5	−0 1162	9 33 57 57	−0 20	+0 06	+2 60		60 03	9 20 49 24	−13 10 79	+24 9
		20	*I P W*		2017	L	4	+0 1175	9 41 9 69	+0 17	−0 03	+2 60	0 00	12 43	9 28 7 49	−13 4 94	
				W	1002	U	5	−0 1044	10 32 19 19	−0 18	+0 06	+2 60		21 67	10 32 16 67	− 0 5 00	+13 1
					2164	L	4	+0 1807	10 55 14 52	+0 27	−0 06	−2 60	−0 01	12 12	10 55 10 86	− 0 1 26	
DEHRA DÚN (E) AND AMRITSAR (W)	DEHRA DÚN (Latitude 30 19)	1886															
				E	2209 Gr 72	L	2	+0 3390	11 27 33 54	−0 86	−0 17	+1 70	−0 07	34 14	11 27 39 51	+ 0 5 37	−14 5
		Apr 1	*I P E*		1105	U	6	−0 1187	11 54 14 85	+0 35	+0 09	−1 70		13 59	11 54 25 59	+ 0 12 00	− 8 2
					Ursæ Minoris	L	2	+0 8697	13 16 29 33	−2 27	−0 48	−1 70	+0 22	25 10	13 16 28 9	+ 0 3 87	
				E	2209 Gr 72	L	3	+0 3390	11 27 37 22	−0 04	+0 07	+1 70		38 95	11 27 39 65	+ 0 0 70	−40 4
					1105	U	6	−0 1187	11 54 8 02	+0 02	−0 04	−1 70	+0 07	6 37	11 54 25 56	+ 0 19 19	
		" 2	*I P W*	W	1191	U	5	−0 1750	11 35 60 10	+0 02	−0 05	−1 70		58 37	12 48 16 88	+12 18 51	
					1192	U	5	−0 1748	11 36 7 62	+0 02	−0 05	−1 70		5 89	12 48 24 59	+12 18 70	−39 5 −39
					79	L	3	+0 7134	11 40 4 60	−0 08	+0 16	−1 70	−0 01	2 97	12 51 46 40	+11 43 43	
				E	2209 Gr 72	L	3	+0 3390	11 27 35 71	−0 04	−0 34	+1 70		37 03	11 27 39 79	+ 0 2 ,6	−45 4
					1105	U	5	−0 1187	11 54 3 37	+0 02	+0 19	−1 70	+0 07	1 95	11 54 25 52	+ 0 23 57	
		3	*I P W*	W	1191	U	5	−0 1750	12 36 2 69	+0 02	+0 26	−1 70		1 27	12 48 16 87	+12 15 60	
					1192	U	5	−0 1748	12 36 10 15	+0 02	+0 26	−1 70		8 73	12 48 24 59	+12 15 86	−41 4 −41 7
					79 "	L	4	+0 7134	12 40 10 15	−0 08	−0 79	−1 70	−0 01	7 57	12 51 46 43	+11 38 86	
				E	2209 Gr 72	L	3	+0 3390	11 26 42 11	+0 26	−0 02	+1 69		44 04	11 27 40 99	+ 0 56 95	− 4 1
		10	*I P E*		1105 "	U	7	−0 1187	11 53 28 07	−0 11	+0 01	−1 69	+0 14	26 42	11 54 25 20	+ 0 58 78	

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
DEHRA DŪN (E) AND AMRITSAR (W)	DEHRA DŪN (Latitude 30 19)	1886							h m s	s	s	s	s	s	h m s	m s	d
				E	2209 Gr 72	L	3	+0 3390	11 26 35 69	−0 11	−0 27	+1 64		36 95	11 27 41 19	+ 1 4 24	− 2 6
					1105	U	7	+0 1187	11 53 21 02	+0 05	+0 15	−1 64	+0 14	19 72	11 54 25 14	+ 1 5 42	
		Apr 11	*I P E*	W	1191	U	5	−0 1750	12 36 36 45	+0 07	+0 21	−1 61		35 12	12 48 16 68	+11 41 56	
					1192 ,	U	5	−0 1748	12 36 44 23	+0 07	+0 21	−1 61		42 90	12 48 24 40	+11 41 50	− 0 1
					79	L	3	+0 7134	12 40 8 32	−0 25	−0 63	−1 61	−0 01	5 82	12 51 47 27	+11 41 45	− 0 1
				E	2209 Gr 72	L	3	+0 3390	11 6 29 06	−0 1	−0 27	+1 6		30 29	11 27 41 38	+ 1 11 09	− 3 5
					1105	U	7	−0 1187	11 53 13 66	+0 05	+0 15	−1 61	+0 14	12 39	11 54 25 08	+ 1 12 69	
		12	*I P E*	W	1191	U	5	−0 1750	12 36 39 54	+0 07	+0 21	−1 6		38 2	2 48 16 6	+11 38 44	
					1192	U	5	−0 1748	12 36 47 07	+0 07	+0 21	−1 61		45 74	12 48 24 36	+11 38 62	− 2 3
					79	L	3	+0 7134	12 40 13 56	−0 25	−0 63	−1 61	−0 01	11 00	12 51 47 43	+11 36 43	− 2 5
	AMRITSAR (Latitude 3 38)	1886															
				E	2209 Gr 72	L	2	+0 33 0	1 40 2 56	+1 32	+0 50	+1 78		6 16	1 27 39 51	−12 26 65	+12 2
					1105	U	3	−0 1151	12 6 60 17	−0 53	−0 27	−1 78	+0 07	57 66	11 54 25 59	−12 32 07	
		Apr 1	*I P E*	W	1191	U	2	−0 1700	12 48 49 18	−0 75	−0 37	−1 75		46 31	12 48 16 88	− 0 29 43	
					1192	U	2	−0 1698	12 48 56 70	−0 75	−0 37	−1 75		53 83	12 48 24 60	− 0 29 23	+13 1
					79	L	2	+0 6958	12 52 2 22	+2 81	+1 13	−1 75	−0 01	4 40	12 51 46 37	− 0 18 03	+12 9
				E	2209 Gr 72	L	3	+0 33 0	1 39 58 92	+1 32	+0 28	+1 79		62 31	11 27 9 65	−12 22 66	+13 5
					1105	U	5	−0 1151	12 6 56 62	−0 53	−0 15	−1 79	+0 07	54 22	11 54 25 56	−12 28 66	
		2	*I P E*	W	1191	U	3	−0 1700	12 48 52 19	−0 75	−0 21	−1 77		49 46	12 48 16 88	− 0 32 58	
					1192	U	3	−0 1698	12 48 60 72	−0 75	−0 21	−1 77		57 99	12 48 24 59	− 0 33 40	+18 5
					79	L	2	+0 69 8	12 52 1 28	+2 81	+0 65	−1 77	−0 01	2 96	12 51 46 40	− 0 16 56	+19 4
				E	2209 Gr 72	L	4	+0 3310	11 39 57 16	+1 17	+0 71	+1 77		60 81	11 27 39 79	−12 21 02	+ 8 5
					1105	U	5	−0 1151	12 6 52 90	−0 47	−0 38	−1 77	+0 07	50 35	11 54 25 52	−12 24 83	
		3	*I P W*	W	1191	U	3	−0 1700	12 48 53 66	−0 66	−0 53	0 00		52 47	12 48 16 87	− 0 35 60	
					1192	U	3	−0 1698	12 49 1 61	−0 66	−0 53	0 00		0 42	12 48 24 59	− 0 35 83	+10 7
					79	L	2	+0 6958	12 52 8 70	+2 49	+1 62	0 00	−0 01	12 80	12 51 46 43	− 0 26 37	+10 9
				E	2209 Gr 72	L	3	+0 3310	11 39 23 20	+1 17	+0 50	+2 62		27 49	11 27 40 99	−12 46 50	− 9 8
		10	*I P W*		1105	U	3	−0 1151	12 6 10 57	−0 47	−0 27	−2 62	+0 14	7 35	11 54 25 20	−11 42 15	
				E	2209 Gr 72	L	3	+0 3310	11 39 19 05	+1 32	+0 28	+2 65		23 30	11 27 41 19	−12 42 11	−17 7
					1105	U	5	−0 1151	12 5 62 53	−0 53	−0 15	−2 65	+0 14	59 34	11 54 25 14	−11 34 20	
		, 11	*I P E*	W	1191	U	3	−0 1700	12 49 17 75	−0 75	−0 21	−2 62		14 17	12 48 16 68	− 0 57 49	
					1192 "	U	4	−0 1698	12 49 25 13	−0 75	−0 21	−2 62		21 55	12 48 24 40	− 0 57 15	−13 8
					79	L	3	+0 6958	12 52 55 92	+2 81	+0 65	−2 62	−0 01	56 75	12 51 47 27	− 1 9 48	−14 2

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for: Collimation	Corrections for: Level	Corrections for: Pen Equation Q	Corrections for: Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
		1886							h m s	s	s		s		h m s	m s	d
DEHRA DŪN (E) AND AMRITSAR (W)	AMRITSAR (Latitud 31 38′)			E	2209 Gr 72	L	3	+0 3310	11 39 13 27	+1 17	+0 60	+2 63		17 67	11 27 41 38	−11 36 29	−21 3
				,	1105	U	5	−0 1151	12 5 55 16	−0 47	−0 32	−2 63	+0 14	51 88	11 54 25 08	−11 26 80	
		Apr 12	*I P W*	W	1191 ,	U	3	−0 1700	12 49 20 82	−0 66	−0 45	−2 65		17 06	12 48 16 65	− 1 0 41	
				"	1192	U	4	−0 1698	12 49 28 09	−0 66	−0 45	−2 65		24 33	12 48 24 36	− 0 59 97	−16 9
					79	L	3	+0 6958	12 53 1 26	+2 49	+1 38	−2 65	−0 01	2 47	12 51 47 43	− 1 15 04	−17 4
DEHRA DŪN (E) AND AGRA (W)	DEHRA DŪN (Latitude 30 19′)	1886															
				E	1191 Gr 72	U	4	−0 1750	12 48 19 10	+0 26	−0 03	−1 60		17 73	12 48 16 19	− 0 1 54	
					1192	U	4	−0 1749	12 48 26 57	+0 26	−0 03	−1 60		25 20	12 48 23 91	− 0 1 29	−11 6
		Apr 20	*I P E*		79	L	3	+0 7128	12 52 3 53	−0 98	+0 08	−1 60		1 03	12 51 49 21	− 0 11 82	−11 8
				W	α Ursæ Minoris	L	2	+0 8686	13 16 40 30	−1 19	+0 10	+1 60		40 81	13 16 30 35	− 0 10 46	−12 5
					1270 Gr 72	U	7	−0 1549	13 45 42 66	+0 23	−0 02	−1 60	+0 09	41 36	13 45 43 61	+ 0 2 25	
				E	1191 Gr 72	U	5	−0 1750	12 48 17 77	+0 04	−0 09	−1 60		16 12	12 48 16 11	− 0 0 01	
					1192	U	5	−0 1 49	12 48 25 49	+0 04	−0 09	−1 60		23 84	12 48 23 83	− 0 0 01	−14 1
		21	*I P W*		79	L	1	+0 7128	12 52 3 56	−0 16	+0 27	−1 60		2 07	12 51 49 52	− 0 12 55	−14 1
				W	Ursæ Minoris	L	1	+0 8686	13 16 35 48	−0 20	+0 34	−1 60		34 02	13 16 30 73	− 0 3 29	−10 5
					1270 Gr ,2	J	5	−0 1549	13 45 37 73	+0 04	−0 08	−1 60	+0 09	36 18	13 45 43 58	+ 0 7 40	
				E	1191 Gr 72	U	4	−0 1750	12 48 16 69	+0 04	+0 12	−1 60		15 25	12 48 16 03	+ 0 0 ,8	
					1192	U	4	−0 1749	12 48 24 52	+0 04	+0 12	−1 60		23 08	12 48 23 75	+ 0 0 67	−13 1
		22	*I P W*		79	L	2	+0 7128	12 52 2 84	−0 16	−0 35	−1 60		0 73	12 51 49 84	− 0 10 89	−12 9
				W	α Ursæ Minoris	L	3	+0 8686	13 16 34 68	−0 20	−0 43	+1 60		35 65	13 16 31 09	− 0 4 56	−15 5
					1270 Gr 72	U	5	−0 1549	13 45 33 64	+0 04	+0 11	−1 60	+0 09	32 28	13 45 43 56	+ 0 11 28	
				E	1191 Gr 72	U	5	−0 1750	12 48 16 82	+0 04	+0 08	−1 62		15 32	12 48 15 95	+ 0 0 63	
					1192	U	5	−0 1749	12 48 24 51	+0 04	+0 08	−1 62		23 01	12 48 23 67	+ 0 0 66	− 8 3
		, 23	*I P E*		79	L	3	+0 7128	12 51 58 94	−0 16	−0 23	−1 62		56 93	12 51 50 15	− 0 6 78	− 8 3
				W	Ursæ Minoris	L	2	+0 8686	13 16 28 72	−0 20	−0 29	+1 61		29 84	13 16 31 42	+ 0 1 58	−13 1
					1270 Gr 72	U	6	−0 1549	13 45 29 97	+0 04	+0 07	−1 61	+0 09	28 56	13 45 43 53	+ 0 14 97	
				E	1191 Gr 72	U	5	−0 1 50	12 48 15 50	+0 04	−0 25	−1 60		13 69	12 48 15 87	+ 0 2 19	
					1192	U	5	−0 1749	12 48 23 21	+0 04	−0 25	−1 60		21 40	12 48 23 59	+ 0 2 19	−17 1
		24	*I P E*		79	L	3	+0 7128	12 52 4 47	−0 16	+0 74	−1 60		3 45	12 51 50 45	− 0 13 00	−17 1
				W	α Ursæ Minoris	L	3	+0 8686	13 16 28 70	−0 20	+0 92	+1 60		31 02	13 16 31 71	+ 0 0 69	−19 3
					1270 Gr 72	U	7	−0 1549	13 45 24 81	+0 04	−0 22	−1 60	+0 09	23 12	13 45 43 51	+ 0 20 39	
				E	1191 Gr 72	U	5	−0 1750	12 48 17 35	−0 17	+0 22	−1 62		15 78	12 48 15 79	+ 0 0 01	
					1192	U	5	−0 1749	12 48 25 32	−0 17	+0 22	−1 62		23 75	12 48 23 51	− 0 0 24	+ 0 5
		25	*I P W*		79 "	L	3	+0 7128	12 51 51 91	+0 65	−0 66	−1 62		50 28	12 51 50 75	+ 0 0 47	+ 0 8
				W	α Ursæ Minoris	L	3	+0 8686	13 16 7 00	+0 79	−0 82	+1 63		8 60	13 16 31 98	+ 0 23 38	+ 1 2
					1270 Gr 72	U	6	−0 1549	13 45 22 81	−0 15	+0 20	−1 63	+0 09	21 32	13 45 43 48	+ 0 22 16	

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for: Collimation	Level	Pen Equation Q	Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
		1886							h m s		s	s	s	s	h m s	m s	d
DEHRA DUN (E) AND AGRA (W)	AGRA (Latitude 27 0)			E	1191 Gr 72	U	3	-0 1797	12 48 24 85	-0 56	-0 33	-2 09		21 87	12 48 16 19	- 0 5 68	
					1192	U	3	-0 1795	12 48 32 59	-0 56	-0 33	-2 09		29 61	12 48 23 9	- 0 5 70	-25 6
		Apr 20	*I P E*		79	L	3	+0 7245	12 52 16 97	+2 09	+0 97	-2 09	0 00	7 94	12 51 49 2	- 0 28 73	-25 5
				W	Ursæ Minoris	L	2	+0 8832	13 16 52 17	+2 55	+1 20	+2 09		58 01	13 16 30 35	- 0 27 66	-24 4
					12 0 Gr 72	U	5	-0 1592	13 45 48 2	-0 49	-0 30	-2 09	+0 09	45 9	13 45 43 6	- 0 2 32	
				E	1191 Gr 72	U	2	-0 1797	12 48 26 33	-0 56	-0 21	-2 10		23 46	12 48 16 11	- 0 7 35	
					1192	U	3	-0 1,95	12 48 33 64	-0 56	-0 2	-2 0		30 77	12 48 23 83	- 0 6 94	-13 1
		21	*I P E*		79	L	2	+0 7245	2 52 8 03	+2 09	+0 62	-2 10	0 00	8 64	12 51 49 52	- 0 19 1	-13 5
				W	Ursæ Minoris	L	2	+0 8832	13 16 41 0	+	+0 77	+2 09		46 5	13 6 30 73	- 0 15 ,8	-15 6
					1270 Gr 72	U	5	-0 1592	13 45 45 83	-0 49	-0 19	-2 09	+0 09	43 15	13 45 43 58	+ 0 0 43	
				E	1191 Gr 72	U	3	-0 1797	12 48 23 32	+0 22	+0 21	-2 10		21 (5	12 48 16 03	- 0 5 62	
					1192	U	3	-0 179	2 48 30 6	+0 22	+0 2	-2 1		28 93	12 48 23 75	- 0 5 18	-19 3
		22	*I P W*		79	L	2	+0 7245	12 52 16 44	-0 81	-0 62	-2 0	0 00	12 91	12 51 49 84	- 0 23 07	-19 8
				W	Ursæ M noris	L	2	+0 8832	13 16 46 40	-0 98	-0 77	+2 09		46 74	13 16 31 09	- 0 15 65	-19 9
					1270 Gr 72	U	5	-0 1592	13 45 40 17	+0 19	+0 19	-2 09	+0 09	38 55	3 45 43 56	+ 0 5 01	
				E	1191 Gr 72	U	3	-0 797	12 48 21 30	-0 86	-0 20	-2 10		18 14	12 48 15 95	- 0 2 19	
					1192	U	3	-0 1795	2 48 28 72	-0 86	-0 20	-2 10		25 56	12 48 23 67	- 0 1 89	-30 9
		23	*I P W*		79	L	3	+0 7245	12 52 18 63	+3 22	+0 59	-2 10	0 0	2 34	2 51 50 5	- 0 30 19	-31 2
				W	Ursæ M noris	L	3	+0 8832	13 16 45 7	+3 92	+0 73	+2 1		52 4(	13 16 31 42	- 0 21 04	-31 5
					1270 Gr 72	U	4	-0 15)2	13 45 34 81	-0 76	-0 18	-2 10	+0 0)	31 86	13 45 43 53	+ 0 11 67	
				E	1191 Gr 72	U	4	-0 179	12 48 23 0(	-0 56	-1 39	-2 08		20 03	12 48 15 87	- 0 4 16	
					1192	U	3	-0 1795	12 48 30 34	-0 56	-0 39	-2 08		27 31	12 48 23 59	- 0 3 ,2	-16 4
		24	*I P E*		79	L	3	+0 7245	12 52 8 23	+2 09	+1 14	-2 08	0 00	9 38	12 5 50 45	- 0 18 93	-16 8
				W	Ursæ Minor s	I	3	+0 883	13 16 30 45	+2 55	+1 42	+2 05		3(47	13 16 31 71	- 0 4 76	-17 8
					1270 Gr 72	U	5	-0 1592	13 45 32 55	-0 49	-0 3	-2 05	+0 09	29 75	13 45 43 5	+ 0 13 76	
				E	1191 Gr 72	U	2	-0 1 97	12 48 22 03	-0 56	-0 39	-2 02		19 06	12 48 15 79	- 0 3 27	
					1192	U	1	-0 1795	12 48 28 89	-0 56	- 39	-2 2		2 92	2 48 23 51	- 0 2 4	-21 6
		25	*I P E*		79	L	3	+0 7245	12 52 12 30	+2 09	+1 14	-2 02	0 00	13 51	12 51 50 75	- 0 22 ,6	-22 5
				W	a Ursæ Minoris	L	3	+0 8832	13 16 30 68	+2 55	+1 42	+1 9)		36 64	13 16 31 98	- 0 4 ((	-22 4
					1270 Gr 72	U	5	-0 1592	13 45 27 62	-0 49	-0 35	-1 99	+0 9	24 88	13 45 43 48	+ 0 18 60	

NOTE —The deviation corrections for both Stations of the Experimental Arc at Dehra Dun were deduced from the readings of a meridian mark and not from Star Observations The method of deduction is fully explained in Part I of this Volume

Between Majors Strahan, Heaviside and Lieut Burrard

By Stars of	Observed with Telescope No 1						Observed with Telescope No 2			Observed with Telescope No 1					
	At AGRA						At AGRA			At AMRITSAR					
	November 11 1885			November 12 1885			November 13 1885			December 30 1885			December 31 1885		
	Star	Decl	Equation S − H	Star	Decl	Equation S − H	Star	Decl	Equation S − H	Star	Decl	Equation S − B	Star	Decl	Equation S − B
North Aspect			s			s			s			s			s
	189	+ 46 24	+ 0 08	109	+ 29 7	+ 0 03	166	+ 30 14	+ 0 02	1 [illegible]	+ 33 6	− 0 08	67	+ 37 19	+ 0 22
	267	+ 28 22	+ 09	158	+ 34 46	+ 10	189	∸ 46 24	+ 06	173	+ 38 50	+ 04	78	+ 43 38	+ 06
	288	+ 40 44	− 06	166	+ 30 14	+ 05	267	+ 28 22	+ 01	2 9	+ 37 53	00	120	+ 32 57	− 01
	349	+ 29 29	+ 11	189	+ 46 24	− 05	349	+ 29 29	+ 09	297	+ 39 23	− 04	155	+ 33 6	+ 01
	377	+ 42 21	+ 1[illegible]	267	+ 28 22	+ 06	401	+ 28 8	+ 03	343	+ 37 8	− 15	173	+ 38 50	− 06
	401	+ 28 8	+ 06	283	+ 40 44	+ 09	409	+ 37 7	+ 07	377	+ 42 21	+ 03	259	+ 37 53	+ 10
	409	+ 37 7	+ 09	349	+ 29 29	− 09	425	+ 42 52	00	409	+ 37 7	+ 05	297	+ 39 23	− 10
	425	+ 42 52	+ 04	377	+ 42 2	+ 06	465	+ 36 39	+ 11	425	+ 42 52	+ 0	343	+ 37 8	+ 08
	465	+ 36 39	+ 02	401	+ 28 8	+ 09	510	+ 42 3	+ 08	465	+ 36 39	+ 07	377	+ 42 21	+ 06
	492	+ 43 48	+ 08	409	+ 37 7	+ 12	566	+ 40 10	+ 05	50	+ 4 0	+ 06	409	+ 37 7	+ 12
	510	+ 42 3	+ 03	425	+ 42 52	+ 15	587	+ 46 32	+ 20	510	+ 42 3	+ 08	425	+ 42 52	+ 23
	544	+ 37 23	+ 14	465	+ 36 39	+ 12				566	+ 40 10	+ 05	465	+ 36 39	+ 01
	566	+ 40 10	00	492	+ 43 48	+ 09				576	+ 36 34	− 01	492	+ 43 48	+ 03
				510	+ 42 3	+ 07							510	+ 42 3	+ 16
				544	+ 37 23	+ 02							566	+ 40 10	− 02
				566	+ 40 10	+ 12							576	+ 36 34	+ 12
													587	+ 46 33	+ 09
	Mean ($S_N - H_N$)		+ 0 065			+ 0 064			+ 0 065	Mean ($S_N - B_N$)		+ 0 015			+ 0 065
			± 0 01			± 0 011			± 0 011			± 0 013			± 0 015
South Aspect	211	+ 14 51	+ 0 04	130	+ 19 40	+ 0 03	130	+ 19 40	+ 0 10	137	+ 9 41	+ 0 03	102	+ 15 49	0 00
	247	+ 18 34	00	142	+ 12 44	00	149	+ 12 35	+ 09	164	+ 28 42	+ 01	137	+ 9 4	+ 10
	307	+ 20 51	+ 06	178	+ 24 0	+ 08	211	+ 14 51	− 02	191	− 4 29	+ 04	164	+ 28 42	− 01
	325	+ 9 18	+ 05	211	+ 14 51	+ 03	247	+ 18 34	− 02	205	− 5 5	+ 05	191	− 4 29	00
	365	+ 23 59	+ 06	229	+ 27 6	+ 02	307	+ 20 51	+ 09	217	+ 20 18	− 12	205	− 5 15	− 02
	439	+ 16 29	+ 07	247	+ 18 34	+ 08	32	+ 9 18	+ 10	229	+ 27 6	+ 04	217	+ 20 18	+ 02
	448	+ 5 33	+ 08	307	+ 20 51	+ 10	365	+ 23 59	+ 08	242	− 1 46	+ 05	229	+ 27 6	+ 07
	477	+ 16 51	00	325	+ 9 18	+ 06	388	+ 3 0	+ 03	274	+ 5 52	+ 02	242	− 1 46	+ 15
	533	+ 19 31	+ 19	365	+ 23 59	00	439	+ 16 29	+ 10	285	+ 31 12	+ 04	274	+ 5 52	+ 06
	556	+ 21 43	+ 06	388	+ 3 0	− 02	448	+ 5 33	+ 03	321	+ 31 25	− 10	285	+ 31 12	+ 07
				439	+ 16 29	+ 20	477	+ 16 51	+ 21	358	+ 29 28	+ 05	311	+ 4 18	− 01
				448	+ 5 33	+ 05	533	+ 19 31	+ 18	388	+ 3 0	− 03	321	+ 31 25	+ 07
				477	+ 16 51	+ 07	556	+ 21 43	+ 04	400	− 1 7	+ 04	358	+ 29 28	+ 08
				533	+ 19 31	+ 15	577	+ 20 15	00	437	+ 4 46	+ 13	388	+ 3 0	+ 02
				556	+ 21 43	+ 07				446	+ 17 46	+ 23	400	− 1 7	+ 06
										453	+ 14 45	− 02	437	+ 4 46	+ 13
										533	+ 19 31	+ 08	446	+ 17 46	+ 08
										542	+ 10 17	− 02	453	+ 14 45	+ 11
										556	+ 21 43	+ 11	533	+ 19 31	+ 05
													542	+ 10 17	+ 07
													556	+ 21 43	+ 07
	Mean ($S_S - H_S$)		+ 0 061			+ 0 061			+ 0 072	Mean ($S_S - B_S$)		+ 0 033			+ 0 056
			± 0 011			± 0 010			± 0 012			± 0 012			± 0 607

TABLE III ABSTRACT OF OBSERVED VALUES OF PERSONAL EQUATION

Between Major Heaviside and Lieut Burrard

By Stars of	Observed with Telescope No 1											
	At AMRITSAR									At MOOLTAN		
	January 7 1886			January 10 1886			January 16 1886			January 24, 1886		
	Star	Declination	Equation H − B	Star	Declination	Equation H − B	Star	Declination	Equation H − B	Star	Declination	Equation H − B
North Aspect	377	+ 42 21	+ 0 10	343	+ 37 8	+ 0 14	510	+ 42 3	+ 0 22	656	+ 34 27	+ 0 06
	492	+ 43 48	00	377	+ 42 21	+ 08	566	+ 40 10	+ 06	667	+ 30 59	+ 05
	566	+ 40 10	+ 12	409	+ 37 7	+ 13	576	+ 36 34	+ 24	698	+ 33 19	+ 12
				425	+ 42 52	+ 20	587	+ 46 33	+ 08	727	+ 40 53	+ 13
				465	+ 36 39	+ 03	624	+ 32 45	+ 09	821	+ 39 43	+ 14
				492	+ 43 48	+ 07	656	+ 34 27	+ 22	877	+ 34 35	+ 14
				510	+ 42 3	+ 05				904	+ 31 29	+ 14
				566	+ 40 10	+ 12				916	+ 40 35	+ 17
				576	+ 36 34	+ 12				953	+ 38 24	+ 16
				587	+ 46 33	00				967	+ 44 26	+ 09
				624	+ 32 45	+ 03				981	+ 39 11	+ 19
				656	+ 34 27	+ 04						
	Mean $(H_N - B_N)$		+ 0 073			+ 0 084			+ 0 152			+ 0 126
			± 0 025			± 0 011			± 0 023			± 0 009
South Aspect	533	+ 19 31	+ 0 03	311	+ 4 18	+ 0 18	533	+ 19 31	+ 0 03	β Ar ot	+ 20 15	+ 0 08
	556	+ 21 43	+ 03	358	+ 29 28	+ 20	556	+ 21 43	+ 14	641	+ 7 12	+ 08
				388	+ 3 0	+ 10	607	+ 20 31	+ 22	687	+ 4 29	+ 13
				400	− 1 7	+ 05				712	+ 19 10	+ 10
				437	+ 4 46	+ 12				741	+ 9 12	+ 12
				446	+ 17 46	+ 15				764	+ 9 4	+ 03
				453	+ 14 45	+ 12				780	+ 14 32	+ 16
				533	+ 19 31	+ 10				789	+ 6 59	+ 10
				542	+ 10 17	+ 23				808	+ 21 28	+ 18
				556	+ 21 43	+ 22				834	+ 25 9	+ 22
				607	+ 20 31	+ 08				852	+ 4 14	+ 06
				641	+ 7 12	+ 13				866	+ 24 43	+ 17
										892	+ 16 1	+ 18
										941	+ 26 1	+ 09
	Mean $(H_S - B_S)$		+ 0 030			+ 0 140			+ 0 130			+ 0 121
			± 0 000			± 0 011			± 0 037			± 0 010

TABLE III ABSTRACT OF OBSERVED VALUES OF PERSONAL EQUATION

Between Majors Strahan, Heaviside and Lieut Burrard

By Stars of	Observed with Telescope No 2						Observed with Telescope No 1					
	At KARACHI						At AMRITSAR					
	February 1 1886			February 2 1886			March 25 1886			March 26 1886		
	Star	Declination	Equation S − H	Star	Declination	Equation S − H	Star	Declination	Equation S − B	Star	Declination	Equation S − B
			s			s			s			s
North Aspect	821	+ 39 43	+ 0 02	821	+ 39 43	+ 0 01	2908	+ 33 8	+ 0 19	3060	+ 38 3	+ 0 12
	831	+ 27 13	− 03	831	+ 27 13	+ 03	2989	+ 44 9	+ 18	3100	+ 38 44	+ 22
	861	+ 28 46	− 01	861	+ 28 46	+ 05	3027	+ 40 38	+ 25	3144	+ 35 6	+ 18
	877	+ 34 35	+ 03	877	+ 34 35	− 07	3060	+ 38 3	+ 25	3162	+ 37 17	+ 20
	916	+ 40 35	+ 01	888	+ 37 52	+ 04	3238	+ 34 9	+ 18	3178	+ 34 52	+ 19
	941	+ 26 1	− 04	916	+ 40 35	− 01	3252	+ 37 0	+ 18	3238	+ 34 9	+ 14
	953	+ 38 24	+ 03	974	+ 28 9	− 06				3252	+ 37 0	+ 22
	Anonymous	+ 28 39	00	993	+ 42 5	+ 02				3268	+ 36 20	+ 21
	974	+ 28 39	− 01	1008	+ 38 52	+ 02				3281	+ 40 45	+ 23
	1123	+ 37 13	− 01	1028	+ 26 40	− 03				3297	+ 35 51	+ 18
	1207	+ 31 33	− 02	1097	+ 31 38	− 03				3375	+ 35 31	+ 22
	1219	+ 39 41	− 11	1105	+ 42 13	+ 0				3416	+ 32 29	+ 30
	1228	+ 35 28	− 03	1123	+ 37 13	− 04				3439	+ 35 33	+ 30
				1175	+ 32 45	+ 03				3446	+ 35 48	+ 22
				1207	+ 31 33	− 02				3468	+ 37 58	+ 23
				1219	+ 39 4	+ 05						
				1228	+ 35 28	+ 01						
	Mean ($S_N - H_N$)		− 0 013			+ 0 003	Mean ($S_N - B_N$)		+ 0 205			+ 0 211
			± 0 007			± 0 006			± 0 010			± 0 008
South Aspect	808	+ 21 28	+ 0 07	808	+ 21 28	+ 0 01	2958	+ 10 30	+ 0 19	3046	+ 30 40	+ 0 12
	845	+ 9 38	+ 05	845	+ 9 38	− 05	Hydræ	+ 6 50	+ 16	3069	+ 28 21	+ 18
	901	+ 17 52	− 04	901	+ 17 52	+ 01	2978	+ 6 16	+ 14	3088	+ 28 21	+ 18
	δ Arietis	+ 19 18	+ 03	933	+ 17 33	00	3013	+ 5 46	+ 08	Cancri	+ 11 8	+ 25
	999	+ 20 37	− 01	950	+ 3 54	+ 03	3046	+ 30 40	+ 15	3123	+ 22 28	+ 22
	1034	+ 20 44	− 02	909	− 8 3	− 01	3069	+ 28 21	+ 23	3194	+ 25 40	+ 28
	1068	+ 9 21	+ 01	966	+ 17 26	+ 02				3206	+ 20 17	+ 18
	1087	+ 12 33	+ 04	δ Arietis	+ 19 18	+ 02				3216	− 4 38	+ 23
	1096	+ 17 28	+ 04	1041	+ 3 16	+ 02				3309	+ 26 26	+ 25
	1143	+ 20 34	+ 01	1052	+ 24 19	− 04				3318	+ 20 43	+ 14
	η Tauri	+ 23 45	00	1068	+ 9 21	+ 03				Leonis	+ 24 18	+ 12
				1079	+ 16 22	− 02				3343	+ 21 8	+ 24
				1090	− 5 28	+ 05				3355	+ 21 43	+ 25
				1135	+ 19 20	+ 05				3361	+ 13 36	+ 10
				1146	+ 23 56	− 03				3423	+ 22 30	+ 23
				1162	+ 5 42	+ 02				3460	+ 19 6	+ 23
				1195	+ 23 37	+ 06						
	Mean ($S_S - H_S$)		+ 0 016			+ 0 010	Mean ($S_S - B_S$)		+ 0 158			+ 0 202
			± 0 007			± 0 005			± 0 014			± 0 010

TABLE III ABSTRACT OF OBSERVED VALUES OF PERSONAL EQUATION

Between Major Strahan and Lieut Burrard

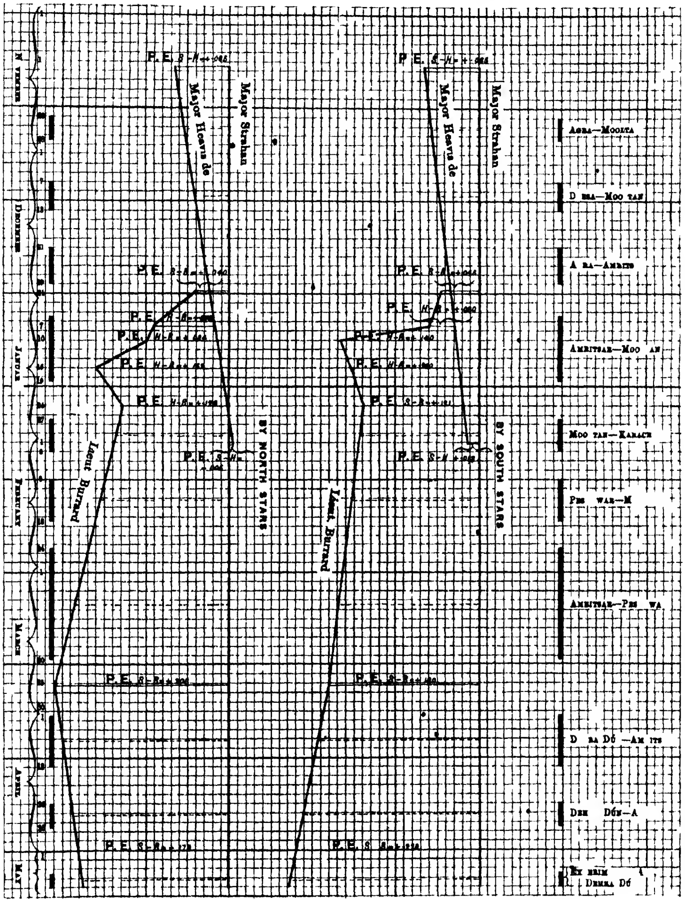
By Stars of	Observed with Telescope No 2					
	At DEHRA DŪN					
	May 1 1886			May 8 1886		
	Star	Declination	Equation S − B	Star	Declination	Equation S − B
North Aspect	3985	+ 56 16	+ 0 17	3985	+ 56 16	+ 0 10
	3998	+ 35 34	+ 08	3998	+ 35 34	+ 18
	4010	+ 38 36	+ 13	4010	+ 38 36	+ 11
	4018	+ 41 33	+ 27	4059	+ 43 44	+ 16
	4059	+ 43 44	+ 17	4128	+ 33 42	+ 17
	4121	+ 54 4	+ 25	4177	+ 43 10	+ 05
	4177	+ 43 10	+ 17	4188	+ 39 39	+ 13
	4203	+ 56 21	+ 20	4217	+ 52 10	+ 29
	4217	+ 52 10	+ 19	4233	+ 33 53	+ 17
	4233	+ 33 53	+ 23	4258	+ 41 30	+ 28
	4258	+ 41 30	+ 18	4285	+ 39 54	+ 21
	4285	+ 39 54	+ 21	4311	+ 38 8	+ 26
	4311	+ 38 8	+ 13	4345	+ 38 56	+ 18
	4335	+ 56 35	+ 09	4360	+ 31 24	+ 18
	4345	+ 38 56	+ 13	4384	+ 36 25	+ 16
				4408	+ 39 8	+ 10
				4420	+ 41 24	+ 23
				4438	+ 40 45	+ 28
				4453	+ 34 42	+ 21
				4467	+ 40 45	+ 21
				4 19	+ 42 41	+ 20
	Mean ($S_N - B_N$)		+ 0 173 ± 0 010			+ 0 184 ± 0 009
South Aspect	3979	+ 8 54	+ 0 17	4031	+ 16 17	+ 0 23
	4031	+ 16 17	+ 20	4049	+ 4 17	+ 24
	4039	+ 4 7	+ 24	4079	+ 10 18	+ 21
	4066	+ 22 6	+ 24	4110	+ 21 11	+ 26
	4094	+ 2 32	+ 23	4139	+ 26 39	+ 19
	4110	+ 21 11	+ 25	4156	+ 18 25	+ 18
	4139	+ 26 39	+ 17	4168	+ 5 56	+ 17
	4156	+ 18 25	+ 24	4242	+ 19 0	+ 13
	4168	+ 5 56	+ 25	4250	+ 9 25	+ 17
	4250	+ 9 25	+ 23	4267	+ 11 3	+ 28
	4267	+ 11 3	+ 18	4277	− 0 57	+ 19
	4277	− 0 57	+ 26	4299	+ 14 11	+ 27
	4299	+ 14 11	+ 22	4328	+ 21 52	+ 22
	4315	+ 28 10	+ 29	4367	+ 11 34	+ 21
				4393	+ 28 10	+ 26
				4440	+ 10 1	+ 22
				4477	− 4 20	+ 30
				4499	+ 14 24	+ 17
				4509	+ 19 39	+ 28
				4529	+ 4 14	+ 19
	Mean ($S_S - B_S$)		+ 0 226 ± 0 006			+ 0 219 ± 0 007

Season	By Stars of North Aspect: Astronomical Date	Telescope in use	Value of the Equation: Mean	General Mean	By Stars of South Aspect: Astronomical Date	Telescope in use	Value of the Equation: Mean	General Mean
Between Majors Strahan and Heaviside								
			$S_N - H_N$ s	$S_N - H_N$ s			$S_S - H_S$ s	$S_S - H_S$ s
1885 86	1885 November 11	No 1	+ 0 065		1885 November 11	No 1	+ 0 061	
	12	1	+ 064	+ 0 065	12	1	+ 061	+ 0 065
	13	2	+ 065		13	2	+ 0 72	
	1886 February 1	No 2	− 0 013	− 0 005	1886 February 1	No 2	+ 0 016	+ 0 013
	2	2	+ 003		2	2	+ 010	
Between Major Strahan and Lieutenant Burrard								
			$S_N - B_N$ s	$S_N - B_N$ s			$S_S - B_S$ s	$S_S - B_S$ s
1885 86	188 December 30	No 1	+ 0 015	+ 0 040	1885 December 30	No 1	+ 0 033	+ 0 045
	31	1	+ 065		31	1	+ 056	
	1886 March 2	No 1	+ 0 205	+ 0 208	1886 March 25	No 1	+ 0 158	+ 0 180
	26	1	+ 211		26	1	+ 202	
	May 1	No 2	+ 0 73	+ 0 179	May 1	No 2	+ 0 226	+ 0 223
	3	2	+ 184		3	2	+ 219	
Between Major Heaviside and Lieutenant Burrard								
			$H_N - B_N$ s	$H_N - B_N$ s			$H_S - B_S$ s	$H_S - B_S$ s
1885 86	1886 January 7	No 1	+ 0 07	+ 0 73	1886 January 7	No 1	+ 0 030	+ 0 030
	January 10	No 1	+ 084	+ 084	January 10	No 1	+ 140	+ 140
	January 16	No 1	+ 152	+ 152	January 16	No 1	+ 130	+ 130
	January 24	No 1	+ 126	+ 126	January 24	No 1	+ 121	+ 121

Final Values of the Equation Adopted

The observations for Personal Equation had a peculiar interest attaching to them this season as it was the first occasion on which *three* observers had been mutually concerned In all previous years the accuracy of the final value of the equation adopted could only be judged of by means of its probable error and this was invariably infinitesimal this season each of three observers had determined his relative equation with the other two and a valuable check was therefore available The result was not satisfactory though the probable errors of the finally adopted equations between any two of the observers remained as minute as heretofore, the equations themselves contradicted each other so that the equation measured directly between Majors Strahan and Heaviside differed considerably from that deduced through observations made separately by each observer with Lieut Burrard In consequence of this

discordance the deduction of the final values of the equation became a matter of some difficulty the more especially as on some arcs all three observers had taken a share in the work it was finally decided that a graphic representation would meet the case and the accompanying diagram was constructed the divisions proceeding horizontally represent two days each, and those vertically hundredths of a second of time



The curves* were drawn as follows —A straight horizontal line was taken to represent the zero or basis from which the several equations were measured and as Major Strahan was the only observer who had worked throughout the season and taken part in all the arcs his name was attached to it Major Heaviside s curve was drawn next the dates on which he had observed for Personal Equation with Major Strahan formed the *abscissæ* of the points plotted and the values of the equation on those dates the ordinates as however they had only observed together twice *viz* on November 12th and February 1st Major Heaviside s curve is of necessity a straight line joining the extremities of the ordinates on those dates Lieut Burrard s curve was plotted last he had observed four times with Major Heaviside and three times with Major Strahan and thus seven points on his curve were known his equations with Major Heaviside were measured vertically downwards from that officer s curve on the dates of

* These lines are not in reality curves but the designation may perhaps be allowed to pass as sufficiently exact for the purpose

observation and his equations with Major Strahan were referred to the zero line The thick black lines at the top and bottom of the diagram represent the dates during which the measurement of each arc was carried on and the dotted lines through the equation curves are drawn at the middle of each arc and give the interpolated value of the Personal Equation to be adopted for that arc The values thus deduced and finally adopted were as follows —

For the Arc Agra–Mooltan	$S_N - H_N = +$ 053		
	$S_S - H_S = +$ 056		
" Deesa–Mooltan	$S_N - H_N = +$ 041		
	$S_S - H_S = +$ 047		
" Agra–Amritsar	$S_N - B_N = +$ 040	$H_N - B_N = +$ 012	$S_N - H_N = +$ 028
	$S_S - B_S = +$ 045	$H_S - B_S = +$ 007	$S_S - H_S = +$ 038
" Amritsar–Mooltan	$S_N - B_N = +$ 118	$H_N - B_N = +$ 105	$S_N - H_N = +$ 013
	$S_S - B_S = +$ 163	$H_S - B_S = +$ 137	$S_S - H_S = +$ 026
" Mooltan–Karachi	$S_N - B_N = +$ 137	$H_N - B_N = +$ 140	$S_N - H_N = -$ 003
	$S_S - B_S = +$ 143	$H_S - B_S = +$ 129	$S_S - H_S = +$ 014
" Peshawar–Mooltan	$S_N - B_N = +$ 155		
	$S_S - B_S = +$ 153		
Amritsar–Peshawar	$S_N - B_N = +$ 185		
	$S_S - B_S = +$ 168		
" Dehra Dun–Amritsar	$S_N - B_N = +$ 199		
	$S_S - B_S = +$ 194		
" Dehra Dun–Agra	$S_N - B_N = +$ 187		
	$S_S - B_S = +$ 211		
Experimental Arc Dehra Dun	$S_N - B_N = +$ 177		
	$S_S - B_S = +$ 227		

In these equations the general symbols S−H and S−B signify quantities which must be *added* to times observed by Major Heaviside and Lieut Burrard respectively before they are compared with those observed by Major Strahan similarly the general symbol H−B signifies the quantity that has to be added to times observed by Lieut Burrard before they can be compared with those observed by Major Heaviside the subscripts N and S referring to what has been usually called in these volumes the aspect* of a star

The above method of deduction by curves is it may be stated not wholly satisfactory and was only employed as the choice of evils It is in the first place based upon the assumption that the Personal Equation between two observers varies with perfect uniformity between the consecutive dates on which they observe a most improbable occurrence It gives too an unduly high weight to the equation of those two observers whose curves chance to be drawn first the straightness or uniformity of these curves depend on the number of points in their path that can be plotted as a bend or change of direction occurs at each and in the curve that happens to be drawn last the known points must of necessity largely outnumber those of the second curve In the accompanying diagram for instance only two points were plotted of Major Heaviside s curve being derived from the two dates on which he had observed with Major Strahan in Lieut Burrard s curve not only were the results of his observations with Major Strahan plotted but also those of his observations with Major Heaviside during the period therefore that all three curves occur together only a half weight attaches to the third observer s work If the three observers were of equal experience this would constitute a most serious objection to the graphical method of deduction in 1885 86 however it happened that from December 30th to February 1st the only period in which all three curves occur together was the first occasion on which Lieut Burrard had been employed on longitude work and that the contradictory results were largely due to his not having acquired a fixed habit of observing is but a justifiable hypothesis

* The aspect of a star is said to be north when the observer stands on the south side of the piers facing towards the north. This occasionally happens when the star may be a few minutes S of the zenith at transit *vide* Vol IX page 83

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES ΔL − ρ

AGRA (E) *Lat 27° 10′ Long 5ʰ 12ᵐ 14ˢ* **AND MOOLTAN (W)** *Lat 30° 11 Long 4ʰ 45 56ˢ*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By H v nde with Tl s pe No 1): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	(W − E): Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equation $S_N - H_N = + 0.053$, $S_S - H_S = + 0.056$	ΔL − ρ
1885					h m s					h m s	s	s	m				
Nov 23	963	+ 40 31	N	*I P E*	3 0 38 43	+1 66	40 09	N	*I P E*	3 26 57 60	+1 17	58 77	26 18 68				
	974	+ 28 38	N	d c + 0 8	2 38 39	+1 57	39 96	N	d c − 6	28 57 19	+1 47	58 66	18 70				
	993	+ 42 5	N	b + 1 4 a − 13 7	7 16 26	+1 66	17 92	N	b − 1 2 a + 46 5	33 35 50	+1 14	36 64	18 72	m 26 18 7 4	+ 0 022	+ 0 053	26 18 ,89
	1017	+ 33 48	N	s Q + 1 50	11 29 25	+1 60	30 85	N	Q + 1 50	37 48 24	+1 34	49 58	18 73				
	1025	+ 28 38	N		13 19 65	+1 57	21 22	N		39 38 49	+1 47	39 96	18 74				
	Ceti	+ 38	S		2 56 12 20	+1 42	13 62	S		3 22 30 41	+1 91	32 32	26 18 70				
	957	+ 24 48	S		58 38 63	+1 54	40 17	S		24 57 32	+1 54	58 86	18 6)				
	974	+ 28 38	S		3 2 38 28	+1 57	39 85	S		28 57 25	+1 47	58 72	18 87	m 26 18	+ 0 022	+ 0 056	26 18 8,0
	δ Arietis	+ 19 8	S		4 59 57	+1 51	61 08	S		31 8 25	+1 63	19 88	18 80				
	1025	+ 28 38	S		1 19 56	+1 57	21 13	S		39 38 46	+1 47	39 93	18 80				
	1123	+ 37 13	N	Q − 1 50	33 3 38 97	−1 38	37 59	N	s Q − 1 50	3 59 58 04	−1 74	56 30	26 18 71				
	1175	+ 32 45	N		42 16 51	−1 41	15 10	N		4 8 35 39	−1 63	33 ,6	8 66	m 26 8 40	+ 0 022	+ 0 053	26 18 815
	1207	+ 31 33	N		46 54 04	−1 42	52 62	N		13 43 02	−1 60	11 42	18 80				
	1219	+ 39 4	N		50 8 45	−1 35	7 10	N		16 27 0	−1 81	25 89	18 79				
	η Tauri	+ 23 45	S		3 40 38 47	−1 46	37 01	S		4 6 57 19	−1 44	55 75	26 18 74	m s 26 8 740	+ 0 022	+ 0 056	26 8 818
Nov 24	963	+ 40 31	N	*I P W*	3 0 37 23	+1 48	38 71	N	*I P W*	3 26 56 30	+1 45	57 75	26 19 04				
	974	+ 28 38	N	d c − 2 4	2 37 17	+1 43	38 60	N	d c 0 0	28 56 01	+1 56	57 57	18 97	m s 26 18 9,8	+ 0 022	+ 0 053	26 9 0 3
	993	+ 42 5	N	b − 1 6 a − 10 9	7 15 12	+1 49	16 61	N	b + 1 8 a + 20 2	33 34 14	+1 42	35 56	18 95				
	1025	+ 28 38	N	Q + 1 52	13 18 42	+1 43	19 85	N	s Q + 1 50	39 37 23	+1 57	38 80	18 95				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

AGRA (E) *Lat 27° 10′ Long 6h 12m 14* AND MOOLTAN (W) *Lat 30° 11 Long 4h 45m 56s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Personal Equations $S_N - H_N = + 0^s 053$ $S_S - H_S = + 0 056$	$\Delta L - \rho$
1885					h m s		s			h m s	s	s	m				
Nov 24	C ti	+ 3 38	S	*I P W*	2 56 10 98	+1 34	12 32	S	*I P W*	3 22 29 48	+1 73	31 21	26 18 89				
	957	+ 24 48	S	d c − 2 4	58 37 41	+1 41	38 82	S	d c 0 0	24 56 15	+1 8	57 73	18 91				
	974	+ 28 38	S	b − 1 6 a −10 9	3 2 37 16	+1 43	38 59	S	b + 1 8 a +20 2	28 56 02	+1 56	57 58	18 99	26 8 934	+ 0 022	+ 0 056	26 19 012
	δ Arieti	+ 19 18	S		4 58 46	+1 39	59 85	S	s	31 17 15	+1 63	18 78	18 93				
	1025	+ 28 38	S	Q + 1 52	13 18 40	+1 43	19 83	S	Q + 1 50	39 37 21	+1 57	38 78	18 95				
	11 8	+ 37 13	N	s Q − 1 52	3 33 37 75	−1 58	36 17	N	Q − 1 50	3 59 56 59	−1 52	55 07	26 8 90				
	1176	+ 32 45	N		42 15 31	−1 60	13 71	N		4 8 34 15	−1 48	32 67	18 96	m s 26 8 9/5	+ 0 022	+ 0 053	26 19 050
	1207	+ 31 33	N		46 52 93	−1 61	51 32	N		13 1 81	−1 46	10 35	19 03				
	1219	+ 39 41	N		50 7 33	−1 57	5 76	N		16 26 31	−1 54	24 77	19 01				
	o Tauri	+ 8 38	S		3 18 35 42	−1 69	33 73	S		3 44 54 02	−1 29	52 73	26 19 00				
	1068	+ 9 20	S		20 54 24	−1 69	52 55	S		47 12 77	−1 30	11 47	8 92	m 26 18 940	+ 0 022	+ 0 056	26 19 018
	1087	+ 12 33	S		24 29 60	−1 68	27 92	S		50 48 13	−1 33	46 80	18 88				
	η Tauri	+ 23 45	S		40 37 36	−1 64	35 72	S		4 6 56 09	−1 4	54 68	18 96				
Nov 25	963	+ 40 31	N	*I P E*	3 0 35 8)	+1 ,6	37 65	N	*I P E*	3 26 55 01	+1 44	56 45	26 18 80				
	974	+ 28 38	N	d c + 0 8	2 35 86	+1 56	37 42	N	d c − 1 6	28 54 85	+1 50	56 35	18 93				
	993	+ 42 5	N	b + 2 9 a −32 7	7 13 70	+1 78	15 48	N	b + 1 2 a + 8 9	33 32 86	+1 44	34 30	18 82	m 26 18 8 8	+ 0 022	+ 0 053	26 18 903
	1017	+ 33 48	N	s	11 26 79	+1 63	28 42	N	s	37 45 75	+1 47	47 22	18 80				
	1025	+ 28 38	N	Q + 1 43	13 17 20	+1 56	18 6	N	Q + 1 50	39 36 0	+1 50	37 55	18 79				
	a C ti	3 38	S		2 56 9 86	+1 21	11 07	S		3 22 28 33	+1 58	29 91	26 18 84				
	9 7	+ 24 48	S		58 36 09	+1 50	37 59	S		24 54 9)	+1 51	56 50	18 9				
	974	+ 28 38	S		3 2 35 87	+1 56	37 43	S		28 54 79	+1 50	56 29	18 86	m s 26 18 848	+ 0 022	+ 0 056	26 18 926
	δ Arietis	+ 19 18	S		4 57 24	+1 43	58 67	S		31 15 96	+1 53	17 49	18 82				
	1025	+ 28 38	S		13 17 15	+1 56	18 71	S		39 36 02	+1 50	37 52	18 81				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

AGRA (E) *Lat 27° 10′ Long 6h 12m 14* AND MOOLTAN (W) *Lat 30° 11 Long 4h 45m 56*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heavinde with Telescop No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Personal Equation $S_N - H_N = + 0.053$, $S_S - H_S = + 0.056$	$\Delta L - \rho$
1885					h m s	s	s			h m s	s	s	m				
Nov 25	1123	+ 37 13	N	*I P E*	3 33 36 27	−1 17	35 10	N	*I P E*	3 59 55 36	−1 55	53 81	26 18 71	m 26 18 728	+ 0 022	+ 0 053	26 18 803
	1175	+ 32 45	N	d c + 0 8	42 3 90	−1 24	12 66	N	d c − 1 6	4 8 32 92	−1 53	31 39	18 73				
	1 07	+ 31 33	N	b + 2 9 a −32 7	46 51 52	−1 26	50 26	N	b + 1 2 a + 8 9	13 10 5	−1 51	9 00	18 74				
	1219	+ 39 41	N	Q − 1 43	50 5 89	−1 12	4 77	N	Q − 1 50	6 25 05	−1 55	23 50	18 73				
	Tauri	+ 8 38	S		3 18 34 23	−1 57	32 66	S		3 44 52 93	−1 43	51 50	26 18 84	m 26 18 8 3	+ 0 22	+ 0 056	6 8 88
	1087	+ 12 33	S		24 28 28	−1 52	26 76	S		50 47 01	−1 44	45 57	18 81				
	η Tauri	+ 23 45	S		40 35 98	−1 37	34 61	S		4 6 54 85	−1 48	53 37	18 76				
Nov 26	963	+ 40 31	N	*I P W*	3 0 34 53	+1 81	36 34	N	*I P W*	3 26 54 12	+1 20	55 32	26 18 98	m 26 9 020	+ 0 00	+ 0 053	26 9 093
	974	+ 28 38	N	d c − 4	2 34 48	+1 66	36 14	N	d c 0 0	28 53 61	+1 59	55 20	19 06				
	993	+ 42 5	N	b + 1 a − 26 1	7 12 33	+1 83	14 6	N	b + 1 5 a + 65 1	33 32 03	+1 14	33 7	19 01				
	1017	+ 33 48	N	s Q + 1 65	11 25 41	+1 72	27 13	N	Q + 1 50	37 44 73	+1 43	46 16	19 03				
	α Ceti	+ 3 38	S		2 56 8 35	+ 4	9 76	S		3 22 26 74	+2 18	28 92	26 19 16	m 6 9 0 8	+ 0 020	+ 0 056	26 19 54
	957	+ 24 48	S		58 34 72	+1 61	36 33	S		24 53 73	+1 69	55 42	19 09				
	974	+ 28 38	S		3 2 34 46	+1 66	36 12	S		28 53 57	+1 59	55 16	19 04				
	δ Arietis	+ 19 18	S		4 55 81	+1 57	57 38	S		31 14 57	+1 83	16 40	19 02				
	1123	+ 37 13	N	s Q − 1 65	3 33 35 17	−1 53	33 64	N	s Q − 1 50	3 59 54 36	−1 67	52 69	26 19 05	m 26 19 075	+ 0 020	+ 0 053	26 9 48
	1175	+ 32 45	N		42 12 82	−1 60	11 22	N		4 8 31 86	−1 54	30 32	19 10				
	1207	+ 31 33	N		46 50 43	−1 60	48 83	N		13 9 41	−1 50	7 92	19 08				
	1219	+ 39 41	N		50 4 86	−1 50	3 36	N		16 24 20	−1 77	22 43	19 07				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AGRA (E) *Lat 27° 10′ Long 5h 12m 14s* AND MOOLTAN (W) *Lat 30° 11 Long 4h 45m 56s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrn for Persl Equations $S_N - H_N = +0\ 053$, $S_S - H_S = +0\ 056$	$\Delta L - \rho$
1885					h m s	s	s			h m s	s	s	m s				
Nov 26	Tauri	+ 8 38	S	*I P W*	3 18 33 15	−1 84	31 31	S	*I P W*	3 44 51 30	−0 94	50 36	26 19 05	m 26 19 068	+ 0 020	+ 0 056	26 19 44
	1068	+ 9 20	S	d c − 1 4	20 51 98	−1 83	50 15	S	d c 0 0	47 10 1	−0 96	9 15	19 00				
	1087	+ 12 33	S	b + 1 1 a − 26 1	24 27 23	−1 81	25 42	S	b + 1 5 a + 65 1	50 45 54	−1 02	44 52	19 10				
	η Tauri	+ 23 45	S	s Q − 1 65	40 34 89	−1 69	33 20	S	s Q − 1 50	4 6 53 60	−1 28	52 32	19 12				
Nov 27	963	+ 40 31	N	*I P E*	3 0 33 79	+1 53	35 32	N	*I P E*	3 26 52 84	+1 28	54 12	26 18 80	m 26 18 747	+ 0 011	+ 0 053	26 18 811
	974	+ 28 38	N	d c − 0 2	2 33 64	+1 58	35 22	N	d c − 1 6	28 52 58	+1 39	53 97	18 75				
	993	+ 42 5	N	b − 0 4 a + 8 6 s Q + 1 61	7 11 76	+1 52	13 28	N	b − 3 1 a + 14 9 s Q + 1 50	33 30 70	+1 27	31 9,	18 69				
	Cet	+ 3 38	S		2 56 7 16	+1 68	8 84	S		3 22 26 09	+1 56	27 65	26 18 81	m 26 8 ,85	+ 0 011	+ 0 056	26 18 8,2
	957	+ 24 48	S		58 33 82	+1 60	35 42	S		24 52 76	+1 42	54 18	18 76				
	974	+ 28 38	S		3 2 33 63	+1 58	35 21	S		28 52 56	+1 39	53 95	18 ,4				
	δ Arieti	+ 19 18	S		4 54 72	+1 62	56 34	S		31 13 73	+1 44	15 17	18 83				
	1123	+ 37 13	N	s Q − 1 61	3 33 34 62	−1 67	32 95	N	Q − 1 50	3 59 53 31	−1 68	51 63	26 18 68	m s 26 18 608	+ 0 011	+ 0 053	26 18 672
	1175	+ 32 45	N		42 12 10	−1 66	10 44	N		4 8 30 71	−1 64	29 07	18 63				
	1207	+ 31 33	N		46 49 79	−1 65	48 14	N		13 8 37	−1 63	6 74	18 60				
	1219	+ 39 41	N		50 4 33	−1 68	2 65	N		16 22 88	−1 71	21 17	18 52				
	η Tauri	+ 23 45	S		3 40 34 04	−1 62	32 42	S		4 6 52 67	−1 57	51 10	26 18 68	m s 26 18 680	+ 0 011	+ 0 056	26 18 747

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AGRA (E) *Lat 27° 10′, Long 5ʰ 12ᵐ 14 :* AND MOOLTAN (W) *Lat 30° 11 Long 4ʰ 45ᵐ 56ˢ*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl. Equations $S_N - H_N = +0^s 053$, $S_S - H_S = +0\ 056$	$\Delta L - \rho$
					h m s	s	s			h m s	s	s	m s				
1885 Nov 28	963	+ 40 31	N	*I P W*	3 0 33 58	+1 63	35 21	N	*I P W*	3 26 52 69	+1 44	54 13	26 18 92				
	974	+ 28 38	N	d; c − 1 4	2 33 33	+1 67	34 90	N	d; c 0 0	28 52 50	+1 56	54 06	19 16				
	993	+ 42 5	N	b + 3 0; a + 11 1	7 11 36	+1 61	12 97	N	b + 1 5; a + 18 7	33 30 58	+1 42	32 00	19 03	m s 26 19 054	+ 0 002	+ 0 053	26 19 109
	1017	+ 33 48	N	s Q + 1 65	11 24 24	+1 66	25 90	N	s Q + 1 50	37 43 48	+1 51	44 99	19 09				
	1025	+ 28 38	N		13 14 52	+1 69	16 21	N		39 33 72	+1 56	35 28	19 07				
	α Ceti	+ 3 38	S		2 56 6 77	+1 78	8 55	S		3 22 25 99	+1 72	27 71	26 19 16				
	957	+ 24 48	S		58 33 40	+1 71	35 11	S		24 52 64	+1 57	54 21	19 10				
	974	+ 28 38	S		3 2 33 28	+1 67	34 95	S		28 52 46	+1 56	54 02	19 07	m s 26 19 072	+ 0 002	+ 0 056	26 19 130
	δ Arietis	+ 19 18	S		4 54 43	+1 71	56 14	S		31 13 58	+1 62	15 20	19 06				
	1025	+ 28 38	S		13 14 63	+1 69	16 32	S		39 33 73	+1 56	35 29	18 97				
	1123	+ 37 3	N	s Q − 1 65	3 33 34 16	−1 67	32 49	N	s Q − 1 50	3 59 53 12	−1 52	51 60	26 19 11				
	1175	+ 32 45	N		42 11 73	−1 64	10 09	N		4 8 30 62	−1 49	29 13	19 04	m s 26 19 030	+ 0 002	+ 0 053	26 19 085
	1207	+ 31 33	N		46 49 39	−1 62	47 77	N		13 8 26	−1 47	6 79	19 02				
	1219	+ 39 41	N		50 3 94	−1 68	2 26	N		16 22 76	−1 55	21 21	18 95				
	ο Tauri	+ 8 38	S		3 18 31 69	−1 55	30 14	S		3 44 50 50	−1 32	49 18	26 19 04				
	1068	+ 9 20	S		20 50 48	−1 55	48 93	S		47 9 28	−1 32	7 96	19 03	m s 26 19 053	+ 0 002	+ 0 056	26 19 111
	1087	+ 12 33	S		24 25 82	−1 56	24 26	S		50 44 67	−1 33	43 34	19 08				
	η Tauri	+ 23 45	S		40 33 65	−1 61	32 04	S		4 6 52 52	−1 42	51 10	19 06				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

AGRA (E) *Lat 27° 10′ Long 5h 12m 14* AND MOOLTAN (W) *Lat 30° 11 Long 4h 45m 56*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constant	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $S_N - H_N = + 0^s 053$ $S_S - H_S = + 0\ 056$	$\Delta L + \rho$
1885					h m s	s	s			h m s	s	s	m s				
Nov 23	1444	+ 28 23	N	*I P W*	4 8 31 21	+1 62	32 83	N	*I P E*	4 34 50 62	+1 46	52 08	26 19 25				
	1452	+ 32 39	N	d o − 2 4	10 45 76	+1 63	47 39	N	d o − 1 6	37 5 25	+1 38	6 63	19 24				
	1497	+ 27 42	N	b + 6 4 a − 6 8	19 59 50	+1 61	61 11	N	b − 2 a +38 8	46 18 81	+1 48	20 29	19 18	m s 26 19 178	− 0 117	+ 0 053	26 19 114
	ι Aurigæ	+ 32 59	N	s Q + 1 51	23 53 90	+1 63	55 53	N	s Q + 1 50	50 13 22	+1 37	14 59	19 06				
	1530	+ 37 43	N		25 50 84	+1 65	52 49	N		52 10 38	+1 27	11 65	19 16				
	1444	+ 28 23	S		4 8 31 17	+1 62	32 79	S		4 34 50 54	+1 46	52 00	26 19 21				
	μ Erid	+ 3 28	S		14 7 69	+1 51	9 20	S		40 26 44	+1 92	28 36	19 16				
	1485	+ 15 42	S		17 32 32	+1 58	33 90	S		43 5 37	+1 66	53 03	19 13	m s 26 9 64	− 0 117	+ 0 056	26 19 103
	1497	+ 27 42	S		19 59 44	+1 61	61 05	S		46 18 75	+1 48	20 23	19 18				
	1508	+ 2 19	S		21 45 65	+1 53	47 18	S		48 4 48	+1 84	6 32	19 14				
	1577	+ 28 7	N	s Q − 1 51	4 35 48 42	−1 40	47 02	N	s Q − 1 50	5 2 7 68	−1 53	6 15	26 19 13				
	1602	+ 38 21	N		39 60 51	−1 36	59 15	N		6 19 94	−1 74	18 20	19 05				
	1614	+ 32 33	N		42 21 76	−1 40	20 36	N		8 41 07	−1 62	39 45	19 09	m s 26 19 104	− 0 117	+ 0 053	26 19 040
	1627	+ 33 15	N		45 4 56	−1 39	3 17	N		11 23 92	−1 63	22 29	19 12				
	1658	+ 28 50	N		50 32 43	−1 40	31 03	N		16 51 70	−1 54	50 16	19 13				
	1577	+ 28 7	S		4 35 48 38	−1 40	46 98	S		5 2 7 64	−1 53	6 11	26 19 13				
	1591	+ 15 27	S		37 33 10	−1 44	31 66	S		3 52 07	−1 34	50 73	19 07				
	1637	+ 21 59	S		46 48 31	−1 42	46 89	S		13 7 40	−1 44	5 96	19 07	m s 26 19 118	− 0 117	+ 0 056	26 19 057
	1658	+ 28 50	S		50 32 38	−1 40	30 98	S		16 51 68	−1 54	50 14	19 16				
	1678	− 0 58	S		52 26 24	−1 50	24 74	S		18 45 01	−1 11	43 90	19 16				
Nov 24	1444	+ 28 23	N	*I P E*	4 8 37 75	+1 56	39 31	N	*I P W*	4 34 56 86	+1 57	58 43	26 19 12				
	1452	+ 32 39	N	d c + 0 8	10 52 30	+1 61	53 91	N	d c 0 0	37 11 49	+1 53	13 02	19 11				
	1497	+ 27 42	N	b + 0 1 a −29 3	20 6 01	+1 55	7 56	N	b + 1 8 a +15 6	46 25 12	+1 57	26 69	19 13	m s 26 19 126	− 0 113	+ 0 053	26 19 066
	ι Aurigæ	+ 32 59	N	s Q + 1 52	24 0 33	+1 62	1 95	N	s Q + 1 50	50 19 53	+1 53	21 06	19 11				
	1530	+ 37 43	N		25 57 25	+1 70	58 95	N		52 16 62	+1 49	18 11	19 16				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

AGRA (E) *Lat* 27° 10′ *Long* 5ʰ 12ᵐ 14 AND MOOLTAN (W) *Lat* 30° 11 *Long* 4ʰ 45ᵐ 56																	
Astronomical Date	Star		Transits Observed at E — *By Strahan with Telescope No 2*					Transits Observed at W — *By Heaviside with Telescope No 1*					Difference of Corrected Times (W − E)		Correction for Rate of W Clock	Corrns fo Persl Equations $S_N - H_N = +0^s\ 053$, $S_S - H_S = +0\ 056$	$\Delta L + \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1885					h m s	s	s			h m s	s	s	m s				
Nov 24	1444	+ 28 23	S	*I P E*	4 8 37 75	+1 56	39 31	S	*I P W*	4 34 56 85	+1 57	58 42	26 19 11				
	μ Erid	+ 3 28	S	d c + 0 8	14 14 44	+1 20	5 64	S	d c 0 0	40 32 98	+1 73	34 71	19 07				
	1485	+ 15 42	S	b + 0 1 a − 29 3	17 38 91	+1 40	40 31	S	b + 1 8 a + 15 6	43 57 88	+1 63	59 51	19 20	m s 26 19 108	− 0 113	+ 0 056	26 19 051
	1497	+ 27 42	S	s Q + 1 52	20 6 03	+1 55	7 58	S	Q + 1 50	46 25 03	+1 57	26 60	19 02				
	1508	+ 2 19	S		21 52 30	+1 27	53 57	S		48 11 01	+1 70	12 71	19 14				
	157[illegible]	+ 28 7	N	s Q − 1 52	4 35 54 93	−1 49	53 46	N	s Q − 1 50	5 2 13 98	−1 43	12 55	26 19 09				
	1602	+ 38 21	N		40 6 90	−1 33	5 57	N		6 26 06	−1 51	24 55	18 98				
	1614	+ 32 33	N		42 28 23	−1 43	26 80	N		8 47 21	−1 47	45 74	18 94	m s 26 19 044	− 0 113	+ 0 053	26 18 984
	1627	+ 33 15	N		45 10 94	−1 42	9 52	N		11 30 16	−1 47	28 69	19 17				
	1658	+ 28 50	N		50 38 94	−1 48	37 46	N		16 57 94	−1 44	56 50	19 04				
	1577	+ 28 7	S		4 35 54 92	−1 49	53 43	S		5 2 13 92	−1 43	12 49	26 19 06				
	1591	+ 15 27	S		37 39 77	−1 64	38 13	S		3 58 49	−1 37	57 12	18 99				
	1637	+ 2 59	S		46 54 82	−1 56	53 26	S		13 13 78	−1 40	12 38	19 12	m s 26 19 046	− 0 113	+ 0 056	26 18 989
	1658	+ 28 50	S		50 38 98	−1 48	37 50	S		16 57 97	−1 44	56 53	19 03				
	1678	− 0 58	S		52 32 96	−1 81	31 15	S		18 51 46	−1 28	50 18	19 03				
Nov .5	1444	+ 28 23	N	*I P W*	4 8 43 81	+1 54	45 35	N	*I P E*	4 35 2 94	+1 49	4 43	26 19 08				
	1452	+ 32 39	N	d c − 2 4	10 58 38	+1 58	59 96	N	d c − 1 6	37 17 51	+1 49	19 00	19 04				
	1497	+ 27 42	N	b + 5 8 a − 25 4	20 12 06	+1 53	13 59	N	b + 1 2 a + 3 5	46 31 26	+1 49	32 75	19 16	m 26 9 106	− 0 113	+ 0 053	26 19 046
	Aurigæ	+ 32 59	N	s Q + 1 43	24 6 35	+1 58	7 93	N	s Q + 1 50	50 25 58	+1 49	27 07	19 14				
	1530	+ 37 43	N		26 3 35	+1 66	5 01	N		52 22 65	+1 47	24 12	19 11				
	1444	+ 28 23	S		4 8 43 73	+1 54	45 27	S		4 35 2 98	+1 49	4 47	26 19 20				
	μ Erid	+ 3 28	S		14 20 37	+1 20	21 57	S		40 39 23	+1 54	40 77	19 20				
	1485	+ 15 42	S		17 44 98	+1 39	46 37	S		44 3 99	+1 51	5 50	19 13	m s 26 19 170	− 0 113	+ 0 0 6	26 19 113
	1497	+ 27 42	S		20 12 07	+1 53	13 60	S		46 31 24	+1 49	32 73	19 13				
	1508	+ 2 19	S		21 58 31	+1 24	59 55	S		48 17 21	+1 53	18 74	19 19				

AGRA (E) *Lat* 27° 10′ *Long* 5ʰ 12ᵐ 14ˢ AND MOOLTAN (W) *Lat* 30° 11′ *Long* 4ʰ 45ᵐ 56ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Heaviside with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Difference of Corrected Times (W − E): Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $S_N - H_N = + 0^s 053$, $S_S - H_S = + 0 056$	$\Delta L + \rho$
1885					h m s	s	s			h m s	s	s	m s				
Nov 25	1577	+ 28 7	N	*I P W*	4 35 60 92	− 1 57	59 35	N	*I P E*	5 2 20 09	− 1 51	18 58	26 19 23				
	1602	+ 38 21	N	d c − 2 4	40 13 03	− 1 42	11 61	N	d c − 1 6	6 32 16	− 1 53	30 63	19 02				
	1614	+ 32 33	N	b + 5 8 a − 25 4	42 34 30	− 1 51	32 79	N	b + 1 2 a + 3 5	8 53 36	− 1 51	51 85	19 06	m s 26 19 093	− 0 113	+ 0 053	26 19 033
	1627	+ 33 15	N	s Q − 1 66	45 17 15	− 1 50	15 65	N	s Q − 1 50	11 36 20	− 1 51	34 69	19 04				
	1658	+ 28 50	N		50 44 94	− 1 56	43 38	N		17 4 00	− 1 51	2 49	19 11				
	1577	+ 28 7	S		4 35 60 96	− 1 57	59 39	S		5 2 20 00	− 1 51	18 49	26 19 10				
	1591	+ 15 27	S		37 45 81	− 1 71	44 10	S		4 4 63	− 1 49	3 14	19 04				
	1637	+ 21 59	S		46 60 93	− 1 63	59 30	S		13 19 91	− 1 50	18 41	19 11	m s 26 19 072	− 0 113	+ 0 056	26 19 015
	1658	+ 28 50	S		50 45 04	− 1 56	43 48	S		17 4 03	− 1 51	2 52	19 04				
	1678	− 0 58	S		52 39 00	− 1 87	37 13	S		18 57 67	− 1 47	56 20	19 07				
Nov 26	1444	+ 28 23	N	*I P E*	4 8 50 01	+ 1 64	51 65	N	*I P W*	4 35 9 16	+ 1 59	10 75	26 19 10				
	1452	+ 32 39	N	d c − 0 2	11 4 47	+ 1 61	6 08	N	d c 0 0	37 23 89	+ 1 47	25 36	19 28				
	1497	+ 27 42	N	b − 0 5 a + 10 9	20 18 19	+ 1 64	19 83	N	b + 1 5 a + 57 4	46 37 43	+ 1 60	39 03	19 20	m s 26 19 230	− 0 113	+ 0 053	26 19 170
	Aurigæ	+ 32 59	N	s Q + 1 66	24 12 51	+ 1 61	14 12	N	s Q + 1 50	50 31 92	+ 1 46	33 38	19 26				
	1530	+ 37 43	N		26 9 54	+ 1 58	11 12	N		52 29 10	+ 1 33	30 43	19 31				
	1444	+ 28 23	S		4 8 49 97	+ 1 64	51 61	S		4 35 9 19	+ 1 59	10 78	26 19 17				
	μ Erid	+ 3 28	S		14 26 02	+ 1 76	27 78	S		40 44 85	+ 2 24	47 09	19 31				
	1485	+ 15 42	S		17 50 94	+ 1 70	52 64	S		44 9 96	+ 1 86	11 82	19 18	m s 26 19 243	− 0 113	+ 0 056	26 19 185
	1497	+ 27 42	S		20 18 10	+ 1 64	19 74	S		46 37 42	+ 1 60	39 02	19 28				
	1508	+ 2 19	S		22 4 02	+ 1 75	5 77	S		48 22 91	+ 2 13	25 04	19 27				
	1577	+ 28 7	N	s Q − 1 66	4 36 7 31	− 1 68	5 63	N	s Q − 1 50	5 2 26 25	− 1 40	24 85	26 19 22				
	1602	+ 38 21	N		40 19 55	− 1 74	17 81	N		6 38 64	− 1 68	36 96	19 15				
	1614	+ 32 33	N		42 40 59	− 1 70	38 89	N		8 59 64	− 1 53	58 11	19 22	m s 26 19 182	− 0 113	+ 0 053	26 19 122
	1627	+ 33 15	N		45 23 58	− 1 71	21 87	N		11 42 57	− 1 54	41 03	19 16				
	1658	+ 28 50	N		50 51 41	− 1 69	49 72	N		17 10 30	− 1 42	8 88	19 16				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

AGRA (E) *Lat* 27° 10′ *Long* 5h 12m 14s : AND MOOLTAN (W) *Lat* 30° 11 *Long* 4h 45m 56s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By H avende with Telescope No 1): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	(W − E): Mean of Group	Correction for Rate of W Clock	Corrns for Peral Equations $S_N - H_N = + 0^s 053$, $S_S - H_S = + 0\ 056$	$\Delta L + \rho$
1885					h m s	s	s			h m s	s	s	m s				
Nov 26	1577	+ 28 7	S	*I P E*	4 36 7 28	−1 68	5 60	S	*I P W*	5 2 26 25	−1 40	24 85	26 19 25	m s 26 19 60	− 0 113	+ 0 056	26 19 103
	1591	+ 15 27	S	d c − 0 2	37 51 89	−1 62	50 27	S	d c 0 0	4 10 56	−1 13	9 43	19 16				
	1637	+ 21 59	S	b − 0 5 a +10 9	47 7 18	−1 66	5 52	S	b + 1 5 a +57 4	13 25 94	−1 26	24 68	19 16				
	1658	+ 28 50	S	s Q − 1 66	50 51 41	−1 69	49 72	S	s Q − 1 50	17 10 21	−1 42	8 79	19 07				
Nov 27	1444	+ 28 23	N	*I P W*	4 8 56 17	+1 53	57 70	N	*I P E*	4 35 15 41	+1 39	16 80	26 19 10	m s 26 19 152	− 0 112	+ 0 053	26 19 093
	1452	+ 32 39	N	d c − 1 4	11 10 75	+1 52	12 27	N	d c − 1 6	37 30 10	+1 36	31 46	19 19				
	1497	+ 27 42	N	b − 2 7 a + 1 8	20 24 40	+1 53	25 93	N	b − 3 1 a +11 4	46 43 73	+1 41	45 14	19 21				
	Aur gæ	+ 32 59	N	s Q + 1 64	24 18 87	+1 52	20 39	N	s Q + 1 50	50 38 11	+1 36	39 47	19 08				
	1530	+ 37 43	N		26 13 84	+1 50	17 34	N		52 35 19	+1 33	36 52	19 18				
	1444	+ 28 23	S		4 8 56 18	+1 53	57 71	S		4 35 15 46	+1 39	16 85	26 19 14	m s 26 19 155	− 0 112	+ 0 056	26 19 099
	μ Erid	+ 3 28	S		14 32 35	+1 58	33 93	S		40 51 61	+1 53	53 14	19 21				
	1485	+ 15 42	S		17 57 13	+1 55	58 68	S		44 16 42	+1 46	17 88	19 20				
	1508	+ 2 19	S		22 10 43	+1 57	12 00	S		48 29 56	+1 51	31 07	19 07				
	1602	+ 38 21	N	s Q − 1 64	4 40 25 69	−1 78	23 91	N	s Q − 1 50	5 6 44 70	−1 67	43 03	26 19 12	m s 26 19 115	− 0 112	+ 0 053	26 19 056
	1614	+ 32 33	N		42 46 90	−1 76	45 14	N		9 5 85	−1 64	4 21	19 07				
	1627	+ 33 15	N		45 29 69	−1 76	27 93	N		11 48 73	−1 64	47 09	19 16				
	1658	+ 28 50	N		50 57 52	−1 75	55 77	N		17 16 49	−1 61	14 88	19 11				
	1591	+ 15 27	S		4 37 58 08	−1 73	56 35	S		5 4 17 08	−1 54	15 54	26 19 19	m s 26 19 153	− 0 112	+ 0 056	26 9 097
	1637	+ 21 59	S		47 13 36	−1 75	11 61	S		13 32 35	−1 58	30 77	19 16				
	1658	+ 28 50	S		50 57 51	−1 75	55 76	S		17 16 53	−1 61	14 92	19 16				
	1678	− 0 58	S		52 51 18	−1 70	49 48	S		19 10 06	−1 48	8 58	19 10				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) *Lat 27° 10′ Long 5h 12m 14s* AND MOOLTAN (W) *Lat 30° 11 Long 4h 45m 56s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heavinde with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl. Equations $S_N - H_N = +0^s 053$ $S_S - H_S = +0\ 056$	$\Delta L + \rho$
1885					h m s	s	s			h m s	s		m s				
Nov 28	1444	+ 28 23	N	I P E	4 9 2 32	+1 60	3 92	N	I P W	4 35 21 45	+1 55	23 00	26 19 08				
	1452	+ 32 39	N	d c − 0 2	11 17 00	+1 56	18 56	N	d c 0 0	37 36 13	+1 5	37 65	19 09				
	1497	+ 27 42	N	b − 0 2 a +18 1	20 30 55	+1 61	32 16	N	b + 1 5 a +14 4	46 49 74	+1 56	51 30	19 14	m s 26 19 076	− 0 113	+ 0 053	26 19 016
	ι Aurigæ	+ 32 59	N	s Q + 1 63	24 25 01	+1 56	26 57	N	s Q + 1 50	50 44 09	+1 52	45 61	19 04				
	1530	+ 37 43	N		26 22 13	+1 51	23 64	N		52 41 19	+1 48	42 67	19 03				
	1444	+ 28 23	S		4 9 2 30	+1 60	3 90	S		4 35 21 50	+1 55	23 05	26 19 15				
	μ Eridani	+ 3 28	S		14 38 35	+1 83	40 18	S		40 57 65	+1 70	59 35	19 17				
	1485	+ 15 42	S		18 3 27	+1 71	4 98	S		44 22 47	+1 61	24 08	19 10	m s 26 19 146	− 0 113	+ 0 056	26 19 089
	1497	+ 27 42	S		20 30 56	+1 61	32 17	S		46 49 73	+1 56	51 29	19 12				
	1508	+ 2 19	S		22 16 39	+1 79	18 18	S		48 35 70	+1 67	37 37	19 19				
	1577	+ 28 7	N	s Q − 1 63	4 36 19 74	−1 66	18 08	N	s Q − 1 50	5 2 38 59	−1 44	37 15	26 19 07				
	1602	+ 38 21	N		40 31 96	−1 76	30 20	N		6 50 73	−1 51	49 22	19 02				
	1614	+ 32 33	N		42 53 05	−1 70	51 35	N		9 11 84	−1 48	10 36	19 01	m s 26 19 026	− 0 113	+ 0 053	26 18 966
	1627	+ 33 15	N		45 36 02	−1 70	34 32	N		11 54 72	−1 48	53 24	18 92				
	1658	+ 28 50	N		51 3 67	−1 66	2 01	N		17 22 57	−1 45	21 12	19 11				
	1577	+ 28 7	S		4 36 19 70	−1 66	18 04	S		5 2 38 52	−1 44	37 08	26 19 04				
	1591	+ 15 27	S		38 4 25	−1 55	2 70	S		4 23 16	−1 38	21 78	19 08				
	1637	+ 21 59	S		47 19 51	−1 61	17 90	S		13 38 39	−1 41	36 98	19 08	m s 26 19 100	− 0 113	+ 0 056	26 19 043
	1658	+ 28 50	S		51 3 62	−1 66	1 96	S		17 22 57	−1 45	21 12	19 16				
	1678	− 0 58	S		52 57 15	−1 45	55 70	S		19 16 15	−1 31	14 84	19 14				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND REDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

DEESA (E) *Lat* 24° 15 *Long* 4h 48m 54s AND MOOLTAN (W) *Lat* 30° 11 *Long* 4h 45m 56s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By H vind with T les op No 1: Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $S_N - H_N = +0^s.041$, $S_S - H_S = +0.047$	$\Delta L - \rho$
1885					h m s	s	s			h m s	s	s	m s				
Dec 7	1475	+ 32 23	N	*I P W*	4 41 58 76	+ 1 93	60 69	N	*I P W*	4 44 57 57	+ 1 64	59 21	2 58 52	s 2 58 513	0 000	+ 0 041	2 58 554
	Aurigæ	+ 32 59	N	d c + 2 8	49 36 36	+ 1 93	38 29	N	d c − 1 0	52 35 18	+ 1 64	36 82	58 53				
	1530	+ 37 43	N	b + 4 4 a − 4 8	51 33 31	+ 1 97	35 28	N	b − 0 6 a + 13 4	54 32 17	+ 1 60	33 77	58 49				
				s Q + 1 71					s Q + 1 70								
	1449	+ 22 44	S		4 35 26 19	+ 1 88	28 07	S		4 38 24 91	+ 1 71	26 62	2 58 55	s 2 58 533	0 000	+ 0 047	2 58 580
	1463	+ 23 25	S		38 51 57	+ 1 88	53 45	S		41 50 32	+ 1 70	52 02	58 57				
	1505	+ 16 50	S		47 29 95	+ 1 87	31 82	S		50 28 56	+ 1 74	30 30	58 48				
	1602	+ 38 21	N	s Q − 1 71	5 5 43 18	− 1 45	4 73	N	s Q − 1 70	5 8 42 15	− 1 80	40 35	2 58 62	s 2 58 588	0 000	+ 0 041	2 58 629
	1614	+ 32 33	N		8 4 42	− 1 49	2 93	N		11 3 28	− 1 76	1 52	58 59				
	1627	+ 33 15	N		10 47 27	− 1 49	45 78	N		13 46 15	− 1 77	44 38	58 60				
	1683	+ 34 18	N		19 21 27	− 1 48	19 79	N		22 20 11	− 1 78	18 33	58 54				
	1586	+ 19 43	S		5 2 12 24	− 1 55	10 69	S		5 5 10 94	− 1 69	9 25	2 58 56	s 2 58 545	0 000	+ 0 047	2 58 592
	1594	+ 13 25	S		3 50 50	− 1 56	48 94	S		6 49 08	− 1 65	47 43	58 49				
	1637	+ 21 59	S		12 31 05	− 1 54	29 51	S		15 29 78	− 1 69	28 09	58 58				
	1671	+ 17 17	S		17 51 69	− 1 54	50 15	S		20 50 37	− 1 67	48 70	58 55				
Dec 8	1475	+ 32 23	N	*I P E*	4 41 59 01	+ 1 84	60 85	N	*I P E*	4 44 57 77	+ 1 67	59 44	2 58 59	s 2 58 610	− 0 001	+ 0 041	2 58 650
	1492	+ 36 31	N	d c + 0 6	45 2 61	+ 1 86	4 47	N	d c − 0 6	48 1 38	+ 1 66	3 04	58 57				
	Aurigæ	+ 32 59	N	b + 3 2 a − 6 1	49 36 54	+ 1 84	38 38	N	b − 0 4 a + 3 3	52 35 34	+ 1 67	37 01	58 63				
	1530	+ 37 43	N	s Q + 1 71	51 33 56	+ 1 86	35 42	N	s Q + 1 70	54 32 41	+ 1 66	34 07	58 65				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

DELSA (E) *Lat* 24 15 *Long* $4^h\ 48^m\ 54^s$: AND MOOLTAN (W) *Lat* 30° 11 *Long* $4^h\ 45^m\ 56^s$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star s Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 1): Star s Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns fo Persl Equations $S_N - H_N = + 0\ 041$, $S_S - H_S = + 0\ 047$	$\Delta L - \rho$
1885					h m s	s	s			h m s	s	s	m s				
Dec 8	1449	+ 22 44	S	*I P E*	4 35 26 45	+1 79	28 24	S	*I P E*	4 38 25 12	+1 69	26 81	2 58 57				
	1463	+ 23 25	S	d c + 0 6	38 5 82	+1 79	53 61	S	d c − 0 6	41 50 54	+1 69	52 23	58 62	m s 2 58 590	− 0 001	+ 0 047	2 58 636
	1485	+ 15 42	S	b + 3 2 a − 6 1	43 15 08	+1 77	16 85	S	b − 0 4 a + 3 3	46 13 71	+1 70	15 41	58 56				
	1505	+ 16 50	S	s Q + 1 71	47 30 08	+1 77	31 85	S	s Q + 1 70	50 28 76	+1 70	30 46	58 61				
	1602	+ 38 21	N	s Q − 1 71	5 5 43 53	−1 56	41 97	N	s Q − 1 70	5 8 42 31	−1 74	40 57	2 58 60				
	1614	+ 32 33	N		8 4 72	−1 58	3 14	N		11 3 46	−1 73	1 73	58 59	m s 2 58 620	− 0 001	+ 0 041	2 58 660
	1627	+ 33 15	N		10 47 56	−1 57	45 99	N		13 46 31	−1 73	44 58	58 59				
	1683	+ 34 18	N		19 21 48	−1 57	19 91	N		22 20 34	−1 73	18 61	58 70				
	1586	+ 19 43	S		5 2 12 43	−1 64	10 79	S		5 5 11 18	−1 71	9 47	2 58 68				
	1594	+ 13 25	S		3 50 66	−1 66	49 00	S		6 49 28	−1 70	47 58	58 58	m s 2 58 608	− 0 001	+ 0 047	2 58 654
	1637	+ 21 59	S		12 31 29	−1 63	29 66	S		15 29 91	−1 71	28 20	58 54				
	1671	+ 17 17	S		17 51 91	−1 65	50 26	S		20 50 59	−1 70	48 89	58 63				
Dec 9	1475	+ 32 23	N	*I P W*	4 41 59 39	+1 76	61 15	N	*I P W*	4 44 58 37	+1 40	59 77	2 58 62				
	1492	+ 36 31	N	d c − 2 2	45 3 05	+1 76	4 81	N	d c − 6 0	48 2 01	+1 39	3 40	58 59	m s 2 58 513	− 0 001	+ 0 041	2 58 553
	Aurigæ	+ 32 59	N	b + 4 3 a + 3 4	49 37 11	+1 76	38 87	N	b − 5 9 a + 5 2	52 35 89	+1 40	37 29	58 42				
	1530	+ 37 43	N	s Q + 1 70	51 34 11	+1 76	35 87	N	s Q + 1 70	54 32 97	+1 32	34 29	58 42				
	1463	+ 23 25	S		4 38 52 22	+1 75	53 97	S		4 41 51 11	+1 41	52 52	2 58 55				
	1485	+ 15 42	S		43 15 50	+1 77	17 27	S		46 14 33	+1 47	15 80	58 53	m s 2 58 537	− 0 001	+ 0 047	2 58 583
	1505	+ 16 50	S		47 30 52	+1 76	32 28	S		50 29 34	+1 47	30 81	58 53				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

DEESA (E) *Lat* 24° 15 *Lo g* 4ʰ 48ᵐ 54 AND MOOLTAN (W) *Lat* 30° 11 *Long* 4ʰ 45ᵐ 56

Astronomical Date	Star		Transits Observed at E *By Strahan with Telescope No 2*					Transits Observed at W *By Heavinde with T les ope No 1*					Difference of Corrected Times (W − E)		Correctio for Rate of E Clock	Corrns for Persl Equations $S_N - H_N = +0^s\ 041$, $S_S - H_S = +0\ 047$	$\Delta L - \rho$
	B A C Number	Decli nation	Sta s Aspect	In strumental Po tion and Correction Constants	Mean Observed Time	Total Corre tion	Seconds of Correct ed Time	Star's Aspect	In strumental Position and Correction Con tants	Mean Observed Time	Total Correc tion	Sec nds of Correct ed Time	By each Star	Mean of Group			
1885					h m s	s	s			h m s	s	s	m				
Dec 9	1602	+ 38 21	N	*I P W*	5 5 44 00	−1 66	42 34	N	*I P W*	5 8 42 88	−2 08	40 80	2 58 46				
	1614	+ 32 33	N	d c − 2 2	8 5 20	−1 64	3 56	N	d c − 6 0	11 4 04	−2 00	2 04	58 48	m 2 58 50	− 0 001	+ 0 041	2 58 545
	1627	+ 33 15	N	b + 4 3 a + 3 4	10 48 01	−1 64	46 37	N	b − 5 9 a + 5 2	13 46 96	−2 01	44 95	58 58				
	1683	+ 34 18	N	s Q − 1 70	19 21 96	−1 64	20 32	N	Q − 1 70	22 20 84	−2 02	18 82	58 50				
	1586	+ 19 43	S		5 2 12 88	−1 66	11 22	S		5 5 11 80	−1 94	9 86	2 58 64				
	1594	+ 13 25	S		3 51 04	−1 64	49 40	S		6 49 87	−1 93	47 94	58 54	m 2 8 560	− 0 001	+ 0 047	2 58 606
	1637	+ 21 59	S		12 31 70	−1 65	30 05	S		15 30 50	−1 94	28 56	58 51				
	1671	+ 17 17	S		17 52 25	−1 64	50 61	S		20 51 09	−1 93	49 16	58 55				
Dec 11	1475	+ 32 23	N	*I P E*	4 42 0 65	+1 91	2 56	N	*I P E*	4 44 59 41	+1 59	61 00	2 58 44				
	1492	+ 36 31	N	d c + 0 6	45 4 18	+1 98	6 16	N	d − 0 6	48 2 95	+1 62	4 57	58 41	m 8 420	− 0 001	+ 0 041	2 58 460
	Aur gæ	+ 32 59	N	b + 2 3 a −31 8	49 38 21	+1 92	40 13	N	b − 3 4 a − 7 6	52 36 96	+1 59	38 55	58 42				
	1530	+ 37 43	N	s Q + 1 71	51 35 19	+2 00	37 19	N	Q + 1 70	54 33 98	+1 62	35 60	58 4				
	1449	+ 22 44	S		4 35 28 20	+1 76	29 96	S		4 38 26 74	+1 58	28 32	2 58 36				
	1463	+ 23 25	S		38 53 60	+1 76	55 36	S		41 52 11	+1 57	53 68	58 32	m 2 58 345	− 0 001	+ 0 047	2 58 9
	1485	+ 15 42	S		43 16 87	+1 66	18 53	S		46 5 31	+ 58	16 89	58 36				
	1505	+ 16 50	S	—	47 31 95	+1 68	33 63	S		50 30 39	+1 58	31 97	58 34				
	1602	+ 38 21	N	s Q − 1 71	5 5 45 06	−1 41	43 65	N	s Q − 1 70	5 8 43 94	−1 79	42 15	2 58 50				
	1614	+ 32 33	N		8 6 34	−1 51	4 83	N		11 5 11	−1 81	3 30	58 47	m 2 58 450	− 0 001	+ 0 041	8 490
	1627	+ 33 5	N		10 49 21	−1 50	47 71	N		13 47 93	−1 81	46 12	58 41				
	1683	+ 34 18	N		19 23 16	−1 48	21 68	N		22 21 91	−1 81	20 10	58 42				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

DLLSA (E) *Lat* 24° 15′ *Long* 4ʰ 48ᵐ 54ˢ AND MOOLTAN (W) *L t* 30° 11 *Lo g* 4ʰ 45ᵐ 56ˢ

Astronomical Date	Star: B A C N mb	Star: D cli at	Transits Observed at E (By St ah w th T lescope No 2): Star' A pect	In tru t l Pos t on d C ct Con tants	M n Ob rved T m	T t l C rre t on	S ds of C rre t d T m	Transits Observed at W (By H vind with T lescope No 1): St Aspect	In trum tal P t n d C rr t Consta ts	Mean Ob rved T me	Total Co c t n	S cond of Corr t d Tim	Difference of Corrected T mes (W − E): By ach Star	Mean f G p	Correcti n f Rate f E Clock	C rrn f P rsl Eq ati ns $S_N - H_N = +0\ 4$, $S_S - H_S = +0\ 047$	$\Delta L - \rho$
1885					*h m s*					*h m*	*s*		*m*				
D c 11	1586	+19 43	S	*I P E*	5 2 14 28	−1 71	2 57	S	*I P E*	5 5 2 84	−1 82	0	2 58 45	= 2 58 403	− 00	+ 0 047	2 58 449
	1594	+ 3 25	S	*d* c + 0 6	3 52 55	−1 79	50 76	S	*d* c − 0 6	6 50 97	− 83	49 14	58 38				
	1637	+2 59	S	b + 2 3 *a* −3 8	12 33	−1 67	31 44	S	b − 3 4 − 7 6	15 3 67	− 8	29 86	58 4				
	1671	+17 17	S	*s* Q − 1 71	17 53 80	−1 74	52 06	S	Q − 7	20 52 25	−1 83	50 42	58 36				
Dec 12	1475	+3 23	N	*I P W*	4 42 1 72	+ 84	3 56	N	*I P W*	4 45 0 50	+1 45	1 95	58 39	= 58 45	− 002	+ 0 4	2 58 489
	1492	+36 31	N	*d* c − 2 2	45 5 3	+ 86	7 6	N	*d* c − 6	48 4 17	+ 46	5 63	58 47				
	Au ige	+32 59	N	b + 5 0 −15 5	49 39 27	+ 84	4 1	N	b − 3 3 − 5 6	52 38 14	+1 45	39 59	58 48				
	1530	+37 43	N	*s* Q + 1 69	51 36 21	+1 89	38 10	N	*s* Q + 1 70	54 35 12	+1 44	36 56	58 46				
	1449	+22 44	S		4 35 29 23	+1 74	30 97	S		4 38 27 9	+1 45	29 36	2 58 39	= 2 58 465	− 00	+ 0 047	2 58 0
	1463	+23 25	S		38 54 53	+ 75	56 28	S		4 53 9	+1 45	54 74	58 46				
	1485	+15 42	S		43 17 8	+1 69	19 50	S		46 16 50	+1 44	17 94	58 44				
	1505	+ 6 5	S		47 2 83	+ 70	34 53	S		50 31 65	+1 45	33 0	58 57				
	1602	+38 21	N	Q − 1 69	5 5 46 20	−1 48	44 72	N	*s* Q − 1 70	5 8 45 06	−1 96	43 10	2 58 38	= 58 438	− 0 002	+ 0 04	2 8 477
	1614	+32 33	N		8 7 40	−1 53	5 87	N		11 6 30	−1 94	4 36	58 49				
	1627	+33 5	N		0 50 26	−1 53	48 73	N		13 49 16	−1 94	47 22	58 49				
	1683	+34 18	N		19 24 25	−1 52	22 73	N		22 23 06	−1 94	21 12	58 39				
	1594	+13 25	S		5 3 53 38	−1 70	51 68	S		5 6 52 21	−1 97	50 24	2 58 56	= 2 58 500	− 0 002	+ 0 047	2 58 545
	1637	+21 59	S		12 34 04	−1 65	32 39	S		15 32 84	−1 93	30 91	58 52				
	1671	+17 17	S		17 54 72	−1 67	53 05	S		20 53 42	−1 95	51 47	58 42				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

DEESA (E) Lat 24° 15 Long 4h 48m 54 AND MOOLTAN (W) Lat 30° 11 Long 4h 45m 56s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star Aspect	Instrumental Position and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 1): Star Aspect	Instrumental Position and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Time (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Personal Equations $S_N - H_N = +0^s 4$, $S_S - H_S = +0 047$	$\Delta L - \rho$
					h m		s			h m			m				
1885																	
Dec 13	1475	+ 32 23	N	I P E	4 42 2 7	+ 1 8	4 5	N	I P E	4 45 37	+ 1 59	96	2 58 44				
	1492	+ 36 31	N	d + 0 6	45 6 30	+ 1 84	8 4	N	d − 0 6	48 4 98	+ 1 59	6 57	58 43	m 58 4	− 002	+ 0 041	58 454
	A urigæ	+ 32 59	N	b + 3 7 − 13 4	49 4 3	+ 82	42 3	N	b − 3 9 − 4 6	5 38 93	+ 58	4 51	58 38				
	1530	+ 37 43	N	Q + 63	5 37 28	+ 85	39 3	N	Q + 1 70	54 35 94	+ 6	37 54	58 4				
	1449	+ 22 44	S		4 35 30 24	+ 72	31 96	S		4 38 28 8	+ 58	30 38	2 58 42				
	1463	+ 23 25	S		38 55 6	+ 2	7 34	S		41 54 8	+ 58	55 6	58 42	m 2 58 438	− 002	+ 047	58 483
	1485	+ 15 42	S		43 8 8	+ 1 68	48	S		46 7 39	+ 57	8 96	58 48				
	1505	+ 16 5	S		47 33 9	+ 1 69	35 59	S		50 32 46	+ 56	34 2	58 43				
	1602	+ 38 21	N	s Q − 1 63	5 5 47 2	− 1 41	45 79	N	s Q − 70	5 8 46 00	− 1 80	44 20	2 58 41				
	1614	+ 32 33	N		8 8 42	− 45	6 97	N		22	− 1 81	5 41	58 44	m 58 395	− 00	+ 0 04	2 58 434
	1627	+ 33 15	N		10 51 26	− 1 44	49 8	N		13 5 0	− 8	48 0	58 38				
	1683	+ 34 18	N		19 25 26	− 1 43	23 83	N		22 23 99	− 1 8	22 8	58 35				
	1586	+ 19 43	S		5 2 16 20	− 1 56	14 64	S		5 5 14 77	− 1 83	12 94	2 58 3				
	1594	+ 13 25	S		3 54 45	− 1 59	52 86	S		6 52 97	− 84	5 3	58 27	m 2 58 255	− 0 002	+ 0 047	2 58 300
	1637	+ 21 59	S		12 35 06	− 54	33 52	S		5 33 55	− 83	3 72	58 20				
	1671	+ 17 17	S		17 55 69	− 1 57	54 12	S		20 54 21	− 1 84	52 37	58 25				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

DEESA (E) *Lat 24 15 Long 4h 48m 54s* **AND MOOLTAN (W)** *Lat 30° 11 Long 4h 45m 56s*

Astronomical Date	Star: B A C Numb	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star Aspect	E: Instrumental Position and Correction Constant	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W, By H av ide with Telescope No 1: Star Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Difference (W − E): Mean of Group	Correction for Rate of W Clock	Corrns. for Personal Equations $S_E - H_E = 0^s 04$, $S_S - H_S = + 0\ 047$	$\Delta L + \rho$
1885					h m	s				h m			m				
Dec 7	014	35 11	N	*I P E*	6 6 56 16	+ 95	58 11	N	*I P W*	6 9 55 1	+1 62	56 73	2 58 62	= 2 58 598	+ 00	+ 0 4	58 640
	2021	+ 35 15	N	d + o 6	8 6 74	+1 96	18 70	N	d c −	11 5 66	+1 62	28	58 58				
	2082	+ 30 34	N	b + 6 5 − 2 4	18 14 94	+1 95	16 89	N	b − o 6 +13 5	21 13 75	+1 67	15 42	58 53				
	2110	+ 32 32	N	Q + 1 71	22 1 30	+1 94	3 24	N	Q + 1 70	25 0 26	+1 64	1 90	58 66				
	1971	+ 23 8	S		5 59 49 6	+1 86	51 02	S		6 2 47 94	+1 71	49 65	2 58 63	= 58 63	+ 001	+ 0 47	58 678
	1086	+ 9 49	S		6 2 6 7	+ 85	18 57	S		5 5 44	+1 72	7 6	58 59				
	2047	+ 2 34	S		13 4 5	+1 86	6 11	S		16 3	+1 71	4 82	58 7				
	2067	+ 21 43	S		15 52 70	+1 86	54 56	S		18 51 43	+1 72	53 5	58 59				
	2156	+ 40 0	N	Q − 1 7 s	6 27 56 67	−1 41	55 26	N	Q − 1 70 s	6 30 55 65	−1 81	53 84	2 58 58	= 58 6 3	+ 0 00	+ 0 04	2 58 65
	2223	+ 41 55	N		39 46 03	−1 39	44 64	N		42 45 14	−1 83	43 31	58 67				
	2237	+ 34 6	N		42 0 24	−1 45	8 79	N		45 9 1	−1 77	17 34	58 55				
	22"0	+ 38 13	N		48 20 47	−1 43	19 04	N		51 19 49	−1 80	7 69	58 65				
	2173	+ 19 46	S		6 30 21 88	−1 57	20 31	S		6 33 20 51	−1 68	18 83	2 58 52	= 2 58 563	+ 0 001	+ 047	2 58 6 1
	2191	+ 17 45	S		32 49 84	−1 58	48 26	S		35 48 50	−1 67	46 83	58 57				
	2199	+ 13 21	S		4 37 43	−1 60	35 83	S		37 36 06	−1 65	34 41	58 58				
	2208	+ 12 49	S		36 33 85	−1 6	32 24	S		39 32 47	−1 65	30 82	58 58				
Dec 8	2021	+ 35 15	N	*I P W*	6 8 6 61	+1 73	18 34	N	*I P E*	6 11 15 27	+1 67	16 94	2 58 60	= 2 59 687 s	+ 0 001	+ 0 041	2 59 729
	2082	+ 30 34	N	d c − 2 2	18 14 66	+1 72	16 38	N	d c − o 6	21 13 42	+1 67	15 09	58 71				
	2110	+ 32 32	N	b + 2 9 a − 1 7	22 1 09	+1 73	2 82	N	b − o 4 + 1 9	24 59 90	+1 67	61 57	58 75				
				Q + 1 70					Q + 1 70 s								

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

DEESA (E) *L t* 24° 15 *Lo g* 4 48ᵐ 64 AND MOOLTAN (W) *L t* 30° 11 *Long* 4ʰ 45 56ˢ

Astronomical Date	Star: B A C Numb	Star: Decli at on	Transits Observed at E (*By St ah with T lescop No 2*): Star Aspect	Instrumental Position and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (*By H and with T l sc p N 1*): Star Aspect	Instrumental Position and Corrected Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction of Rate of W Clock	Corrn f Personal Equations $S_E - H_E = +0.4$ $S_E - H = +0.47$	$\Delta L + \rho$
1885					h m					h m s			m				
Dec 8	1971	+ 23 8	S	*I P W*	5 59 48 9	+ 71	50 6	S	*I P E*	6 47 62	+ 68	49 3	58 (8	s 58 66	+ 00	+ 0 47	58 708
	1986	+ 9 49	S	d − 2 2	6 16 5	+	8 2	S	d − 6	5 5 24	+1 68	6 9	58 7				
	2047	+ 2 34	S	b + 2 9 − 1 7	13 4	+ 7	5 8	S	b − 0 4 + 9	16 2 76	+ (8	4 44	58 63				
	2067	+ 43	S	Q + 7	5 52 50	+ 7	54	S	Q + 7	18 5 5	+ 68	52 83	58 62				
	2156	+ 4 0	N	Q − 7	6 27 56 5	−1 67	54 83	N	Q − 1 7	6 30 55 25	−1 73	53 52	2 58 69	s 58 80	+ 00	+ 04	58 42
	2228	+ 4 55	N		39 45 99	− 67	44 32	N		4 44 0	− 74	4 96	58 64				
	2 37	+ 34 6	N		4 2 06	− 67	8 39	N		45 8 78	− 73	7 05	58 66				
	2270	+ 38 3	N		48 2 33	− 67	8 66	N		5 9 0	− 73	7 47	58 8				
	2173	+ 9 46	S		6 30 2 56	−1 69	9 87	S		6 33 20 8	−1 72	8 46	2 58 59	s 58 585	+ 0 00	+ 047	58 633
	2191	+ 17 45	S		32 49 57	− 69	47 88	S		35 48 25	− 72	46 53	58 65				
	2199	+ 3	S		34 37 4	−1 70	35 44	S		37 35 77	−1 71	34 6	58 62				
	2208	+ 12 49	S		36 33 62	−1 70	31 9	S		39 32 1	− 7	3 40	58 48				
Dec 9	2014	+ 35	N	*I P E*	6 6 55 61	+1 87	57 48	N	*I P W*	6 9 54 73	+ 38	56 1	2 58 63	s 58 5 8	0 000	+ 0 04	58 6 9
	2021	+ 35 5	N	d + 0 6	8 6 13	+1 89	8 2	N	d − 6 0	9	+ 38	6 57	58 55				
	2062	+ 30 34	N	b + 4 4 − 9 8	8 4 4	+ 85	6 25	N	b − 5 9 + 5 2	2 3 42	+ 4	4 82	58 57				
	2110	+ 32 32	N	Q + 1 7	22 0 75	+1 87	2 62	N	Q + 1 7	24 59 79	+1 39	61 8	58 56				
	1971	+ 23 8	S		5 59 48 60	+1 8	50 4	S		6 2 47 54	+1 42	48)6	2 58 55	s 2 58 565	000	+ 047	58 6
	1986	+ 9 49	S		6 2 16 4	+ 79	7 93	S		5 5 3	+ 46	6 49	58 56				
	2047	+ 2 34	S		13 3 74	+1 81	5 55	S		16 2 66	+1 43	4 09	58 54				
	2067	+ 21 43	S		15 52 16	+1 81	53 97	S		18 51 12	+1 46	52 58	58 61				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

DEESA (E) *Lat 24° 15 Long 4h 48m 54* AND MOOLTAN (W) *L t 30° 11 Lo g 4h 45m 56s*

Astronomical Date	Star: B A C Numbe	Star: De l t on	Transits Observed at E, *By St ah with T l ope No 2*: Star Aspect	I st mental P it on d C rr t n Co ta t	Mean Ob rved T me	Total Correc ti n	Sec nd of Corre t d Tim	Transits Observed at W, *By Heaviside with T le cop N 1*: Star Aspect	In trum tal Pos t d Corr t C ta ts	Mean Obs rved Time	Tot l C rre t o	Second of C rr t d T me	Diff renc of Corre ted Times (W − E): By each Sta	Mean f Gr p	Correct f Rat f W Cl ck	C rrns f P rsl Equati ns $S_N - H_N = + 04$ $S_S - H_S = + 4$	$\Delta L + \rho$
1885					*h m s*					*h m*			*m*				
Dec 9	2156	+ 40 0	N	*I P E*	6 27 54 4	+ 2	54 62	N	*I P W*	6 3 55·26	− 2 08	53 8	58 56	*m* 58 5 3	000	+ 4	8 6 4
	2223	+ 41 55	N	*d* + 0 6	39 45 43	− 1 48	43 95	N	*d* c − 6	42 44 69	− 2 09	42 60	58 65				
	2237	+ 34 6	N	b + 4 4 − 9 8	42 9 73	− 1 52	8 21	N	b − 5 9 + 5 2	45 8 73	− 2 02	16 7	58 5				
	2270	+ 38 3	N	*s* Q − 1 70	48 19 96	− 1 50	18 46	N	Q − 7	51 19 12	− 2 08	17 04	58 58				
	2173	+ 19 46	S	Q 0 00	6 30 19 61	+ 0 09*	19 70	S	Q 0 00	6 33 20 10	− 1 94	18 6	2 58 46	*m* 58 495	000	+ 47	58 54
	2191	+ 7 45	S		32 47 57	+ 9	47 66	S		35 48 03	− 94	46 09	58 43				
	2199	+ 13 21	S		34 35 14	+ 0 07	35 2	S		37 35 67	− 93	33 74	58 53				
	2208	+ 12 49	S		36 3 5	+ 0 07	31 58	S		39 32 07	− 1 93	30 4	58 56				
Dec 11	2014	+ 35 11	N	*I P W*	6 6 55 21	+ 1 91	57 12	N	*I P E*	6 9 54 23	+ 1 61	55 84	2 58 72	*m* 58 3	000	+ 4	58 744
	2021	+ 35 15	N	*d* c − 2 2	8 5 72	+ 9	7 63	N	*d* c − 0 6	4 70	+ 1 61	16 3	58 68				
	2082	+ 30 34	N	b + 3 6 − 29 8	8 4 00	+ 84	15 84	N	b − 3 4 − 8 8	2 2 94	+ 6	4 54	58 7				
	2110	+ 32 32	N	Q + 1 71	22 0 30	+ 87	2 7	N	Q + 1 70	24 59 29	+ 1 59	60 88	58 7				
	1971	+ 23 8	S		5 59 48 25	+ 71	49 96	S		6 2 47 03	+ 1 59	48 62	2 58 66	*m* 58 680	0 000	+ 047	2 58 7 7
	1986	+ 9 49	S		6 2 15 8	+ 1 68	17 49	S		5 14 53	+ 59	6	58 63				
	2047	+ 22 34	S		3 3 39	+ 1 71	5 10	S		16 2 21	+ 1 59	3 80	58 70				
	2067	+ 2 43	S		15 51 77	+ 1 70	53 47	S		18 50 61	+ 1 59	52 2	58 73				
	2156	+ 40 0	N	Q − 1 7	6 27 55 65	− 1 43	54 22	N	Q − 1 70	6 30 54 65	− 1 77	52 88	2 58 66	*m* 58 688	0 000	+ 0 04	2 58 7 9
	2223	+ 4 55	N		39 45 4	− 39	43 65	N		42 44	− 77	42 34	58 69				
	2237	+ 34 6	N		42 19 27	− 53	17 74	N		45 8 25	− 1 78	16 47	58 73				
	2270	+ 38 13	N		48 19 55	− 1 46	18 09	N		51 18 56	− 1 80	16 76	58 67				

Owing to the irregul rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and con sequently in these cases Q = 0 00

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

DEESA (E) *Lat 24° 15 Lo g 4ʰ 48ᵐ 54* AND MOOLTAN (W) *Lat 30° 11 Long 4ʰ 45 56*

Astronomical Date	Star: B A C Numb	Star: D h t	Transits Observed at E (By St ah with T lescop No 2): Sta Aspect	Transits Observed at E: I t m tal P it nd C re t C t t	Transits Observed at E: M a Observ d Time	Transits Observed at E: Total Correc t n	Transits Observed at E: Seco ds of C rr ed Tu	Transits Observed at W (By H vand w th T lescop N 1): Star' A pect	Transits Observed at W: I t tal P t n d C re t n C t t	Transits Observed at W: Mean Ob rved Tim	Transits Observed at W: Tot l C rrec t n	Transits Observed at W: S d f Co t l 1	D fference f Cor ected T m s (W − E): By each Sta	D fference f Cor ected T m s (W − E): M an of G p	Correct f Rate f W Clock	Corrns f P rsl Equat ns $S_N - H_N = + 04$ $S_S - H_S = + 047$	$\Delta L + \rho$
1885					h m					h m			m				
Dec 11	2178	+ 9 46	S	*I P W*	6 3 0 90	− 75	19 15	S	*I P E*	6 33) 68	− 80	7 88	2 58 73	m 58 6 8	000	+ 047	58 7 5
	2191	+ 7 45	S	*d* c − 2	32 48 98	− 77	47 2	S	*d* − 6	35 47 67	− 83	45 84	58 63				
	2199	+ 3	S	b + 3 (−29 8	34 36 59	− 8	34 78	S	b − 3 4 − 8 8	37 35 26	− 83	33 43	58 (5				
	2208	+ 49	S	Q − 7	36 33 1	− 82	3 9	S	Q − 7	39 31 73	−1 84	29 89	58 7				
Dec 12	2014	+ 35	N	*I P E*	6 6 55 09	+1 93	57	N	*I P W*	6 9 54 02	+ 48	55 50	2 58 48	m 58 535	0 000	+ 4	58 5 6
	2021	+ 35 5	N	*d* c + 6	8 15 55	+ 93	7 48	N	*d* − 6	1 4 62	+1 48	16 0	58 6				
	2082	+ 30 34	N	b + 3 6 −2 7	18 3 84	+ 88	5 72	N	b − 3 3 − 6 8	2 77	+ 45	4	58 5				
	2110	+ 32 32	N	Q + 1 70	22 0 21	+ 9		N	Q + 70	24 59 2	+ 45	60 65	58 54				
	1971	+ 23 8	S		5 59 48 09	+1 78	49 87	S		6 2 46 94	+1 45	48 39	2 58 52	m 8 498	000	+ 0 047	58 545
	1986	+ 19 49	S		6 2 5 63	+ 76	7 39	S		5 4 49	+1 45	5 94	58 55				
	2047	+ 22 34	S		3 3 29	+ 77	5 06	S		16 2	+1 45	3 55	58 49				
	2067	+ 21 43	S		5 51 69	+ 77	53 46	S		8 5 44	+ 45	5 89	58 43				
	2156	+ 40	N	Q − 1 ,0	6 27 55 57	− 41	54 6	N	Q − 7	6 30 54 66	− 95	52 7	2 58 55	m 58 4 3	000	+ 0 04	58 5 4
	2223	+ 4 55	N		39 44 96	− 38	43 58	N		4 43 99	− 95	42 04	58 46				
	2237	+ 34 6	N		42 9 23	− 48	7 75	N		45 8	− 95	16 17	58 4				
	2270	+ 38 3	N		48 9 43	− 44	7 99	N		5 18 4	− 95	16 45	58 46				
	2178	+ 19 46	S		6 30 20 76	−1 65	19 11	S		6 33 9 54	−1 94	7 60	58 49	m 2 58 493	000	+ 047	58 54
	2191	+ 7 45	S		32 48 83	−1 67	47 6	S		35 47 57	− 94	45 63	58 47				
	2199	+ 3	S		34 36 40	− 69	34	S		37 35 5	− 97	33 8	58 47				
	2208	+ 12 49	S		36 32 9	−1 71	31 08	S		39 31 60	−1 98	29 62	58 54				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

DEESA (E) Lat 24° 15' Long 4h 48m 54s AND MOOLTAN (W) Lat 30° 11' Long 4h 45m 56s

Astronomical Date	Star		Transits Observed at E — By St ah n with Telescope No 2					Transits Observed at W — By H unde with Telescope No 1					Difference of Corrected Times (W − E)		Correction for Rate of W Clock	Correction for Personal Equation $S_N - H_N = + 0^s 04$; $S_S - H_S = + 0$ 47	$\Delta L + \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1885					h m					h m s			m				
Dec 13	2014	+ 35	N	I P W d − 2 2 b + 8 a − 8 6 s Q + 70	6 6 55 03	+ 76	56 79	N	I P E d c − 6 b − 3 9 − 7 1 Q + 1 70	6 9 53 7	+ 60	55 3	2 58 5	m 58 5	0 00	+ 0 04	58 611
	2021	+ 35 5	N		8 15 56	+ 76	17 32	N		11 4 24	+1 6	15 84	58 5				
	2082	+ 3 34	N		18 3 73	+ 74	5 47	N		21 12 4)	+1 59	4 8	58 6				
	2110	+ 32 32	N		22 0 09	+1 75	84	N		24 58 89	+1 59	6 48	58 64				
	1971	+ 23 8	S		5 59 47 96	+ 70	49 66	S		6 2 46 64	+1 57	48 21	2 58 55	m 2 8 500	000	+ 047	2 58 547
	1986	+ 19 49	S		6 2 5 47	+ 69	7 6	S		5 14 5	+1 57	15 72	58 56				
	2047	+ 2 34	S		3 3 09	+ 70	4 79	S		16 66	+ 57	3 23	58 44				
	2067	+ 21 43	S		15 5 49	+1 70	53 9	S		8 50 07	+ 57	5 64	8 45				
	2156	+ 40 0	N	Q − 1 0	6 27 55 47	−1 62	53 85	N	s Q − 1 70	6 3 54 19	−1 79	52 40	2 58 55	m 58 543	000	+ 0 041	58 584
	2228	+ 41 55	N		39 44 90	− 61	43 29	N		42 43 6	−1 79	41 82	58 53				
	2237	+ 34 6	N		42 19 05	−1 64	7 41	N		45 7 74	−1 80	15 94	58 53				
	2270	+ 38 13	N		48 19 39	−1 63	17 76	N		51 18 11	−1 79	16 32	58 56				
	2173	+ 19 46	S		6 3 2 57	−1 7	8 86	S		6 33 19 22	−1 83	17 39	2 58 53	m 2 58 548	0 000	+ 0 047	2 58 595
	2191	+ 17 45	S		32 48 58	−1 71	46 87	S		35 47 21	−1 86	45 35	58 48				
	2199	+ 13 21	S		34 36 1	−1 72	34 39	S		37 34 85	−1 86	32 99	58 60				
	2208	+ 12 49	S		36 32 60	−1 73	30 87	S		39 31 29	−1 84	29 45	58 58				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

AGRA (E) *Lat* 27° 10′ *Long* 5^h 12^m 14^s AND AMRITSAR (W) *Lat* 31 38′ *Long* 4 59 39

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By St aha with Telescope No 2): Star Aspect	Instrumental Pen and Corrected Constants	Mean Observed Time	Total Correction	Sidereal Corrected Time	Transits Observed at W (By H d with Telescope No 1): Star Aspect	Instrumental and Corrected Constants	Mean Observed Time	Total Correction	Sidereal Corrected Time	Difference of Corrected Times (W − E): By Star	Mean of Group	Correction for Rate of E Clock	Correction for Personal Equation at $S_N - H_N = + 0\ 38$, $S_S - H_S = + 0\ 38$	$\Delta L - \rho$
1885					*h m*		*s*			*h m*			*m*				
D 21	1830	+ 39 8	N	*I P E*	5 4 4 95	+ 44	6 39	N	*I P E*	5 53 5 9	+0 4	5 04	2 34 65				
	1844	+ 37 16	N	*d* − 3 3	43 4 14	+1 44	5 58	N	*d* + 1 2	55 50 2	+0 2	5 33	34 75	= 34 673	000	+ 0 028	34 70
	1857	+ 33 53	N	b − 5 − 2 1	45 5 53	+1 45	6 98	N*	b + 8 − 5 4	57 41 62	+ 09	4 71	34 73				
	1935	+ 37 58	N	Q + 59	57 1 78	+ 44	3 22	N	Q 0 00	6 9 47 66	+0 12	4 78	34 56				
	1876	+ 20 5	S		5 47 35 99	+1 43	37 42	S		6 0 12 7	0 00	12 07	2 34 65				
	1896	+ 25 56	S		5 53 9	+ 45	54 74	S		3 29 4	+ 5	9 45	34 7	= 34 6	0 000	+ 38	34 08
	1907	+ 12 48	S		52 26 33	+ 45	27 78	S		5 2 5	−0 4	2 47	34 69				
	1925	+ 2 4	S		54 46 7	+ 45	48 5	S		7 22 76	+ 02	22 78	34 63				
	2014	+ 35 1	N	Q − 1 59	6 9 57 3	− 73	55 30	N	Q − 87	6 22 3 69	−1 77	29 9	2 34 62				
	2021	+ 35 5	N		11 17 54	− 73	5 81	N		23 52 2	− 77	50 44	34 63	= 34 64	0 000	+ 28	1 34 668
	2082	+ 30 34	N		21 15 75	− 73	4 02	N		33 50 5	− 8	48	34 68				
	2110	+ 32 32	N		25 2 16	− 74	42	N		3 36 83	− 78	35 05	34 63				
	1971	+ 23 8	S		6 2 49 93	−1 73	48 20	S		6 15 24 65	−1 85	22 80	2 34 60				
	1986	+ 9 49	S		5 17 46	−1 74	15 72	S		1 5 38	−0 01	5 37	34 65	= 34 670	000	+ 0 038	34 08
	μ Gem	+ 22 34	S		6 5 7	− 74	3 33	S		28 39 94	− 86	38 8	34 75				
	2067	+ 2 43	S		8 53 48	− 73	5 75	S		3 26 43	00	26 43	34 68				
		—															
Dec 22	1830	+ 39 8	N	*I P W*	5 41 14 77	+1 58	16 35	N	*I P W*	5 53 49 35	+1 69	51 04	2 34 69				
	1844	+ 37 16	N	*d* c − 1 3	43 14 11	+1 57	15 68	N	*d* c − 2 8	55 48 68	+1 69	50 37	34 69	= *s* 34 693	+ 003	+ 0 28	34 / 4
	1857	+ 33 53	N	b − 0 5 a − 6 2	45 5 45	+1 56	7 01	N	b − 5 6 a − 7 5	57 40 05	+ 69	4 74	34 73				
	1935	+ 37 58	N	*s* Q + 1 58	57 11 62	+1 57	13 19	N	*s* Q + 1 90	6 9 46 17	+1 68	47 85	34 66				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off and consequently in these cases Q = 0 00

OF THE APPARENT DIFFERFNCE OF LONGITUDES $\Delta L - \rho$

AGRA (E) *L t 27° 10′ Lo g 5 12ᵐ 14* AND AMRITSAR (W) *Lat 31° 38′ Long 4ʰ 59 39ˢ*

Astronomical Date	Star: B A.C Numb	Star: De l t	Transits Observed at E (By Str h with T les op No 2): Star A pe t	I tr m ntal Pos t on nd Corr ct on C t t	Mean Ob rved Time	Total Co t n	Se o d f C rr t d Time	Transits Observed at W (By H nde w th T l pe No 1): Sta Aspect	I strum tal Pos t on and C r t n Co t t	Mea Ob rved Tim	Tot l C t on	Se nds of Corr ct ed Tim	Diff en of Corr t d Times (W − E): By e cl Sta	Mean of Group	C rrect n f Rate of E Clock	Corrn for Persl Equatio $S_N - H_N = + 0^s\ 8$ $S_S - H_S = + 0\ 038$	ΔL − ρ
188				I P W	h m s	s	s		I P W	h m	s	s	m s				
Dec 2	1876	+ 20 15	S	d	5 47 35 88	+1 50	37 38	S	d	6 0 0 46	+1 67	12 13	12 34 75	m 2 34 683	+ 003	+ 38	34 724
	1896	+ 25 56	S	c − 1 3 b − 5	50 53 24	+1 52	54 6	S	− 2 8 b − 5 6	3 27 80	+ 67	29 47	34 71				
	1907	+ 2 48	S	− 6 2	52 26 4	+ 5	27 9	S	− 7 5	5 87	+ 66	2 53	34 62				
	1925	+ 22 24	S	Q + 1 58	54 46 65	+ 53	48 8	S	Q + 9	7 2 6	+ 67	83	34 6				
	2082	+ 30 34	N	Q 0 00 (s)	6 21 14 5	−0 04	4 0	N	Q − 1 90 (s)	6 33 50 85	−2 1	48 74	34 73	m 34 695	+ 003	+ 0 0 8	2 34 7 6
	2110	+ 32 32	N		25 0 43	−0 4	0 39	N		37 37 16	−2 1	35 05	34 66				
	2067	+ 2 43	S		6 8 5 75	−0 7	5 68	S		6 31 28 46	−2 14	26 32	12 34 64	m 34 64	+ 0 003	+ 0 38	2 34 68
Dec 23	1830	+ 39 8	N	I P E	5 41 14 06	+1 60	5 66	N	I P E	5 53 48 20	+2 18	50 38	12 34 72	m 34 55	+ 0 008	+ 0 28	1 34 9
	1844	+ 37 16	N	d c − 0 3	43 3 35	+1 59	14 94	N	d c + 1 2	55 47 58	+2 17	49 75	34 81				
	1857	+ 33 53	N	b − 1 2 − 8 7	45 4 77	+1 58	6 35	N	b + − 1 0	57 38 91	+2 17	4 08	34 73				
	1935	+ 37 58	N	Q + 1 60 (s)	57 86	+1 60	12 46	N	Q + 2 11 (s)	6 9 45 05	+2 17	47 22	34 76				
	1876	+ 20 15	S		5 47 35 9	+1 55	36 74	S		6 0 9 25	+2 17	11 42	12 34 68	m s 2 34 733	+ 008	+ 0 038	12 34 779
	1896	+ 25 56	S		50 52 49	+1 56	54 05	S		3 26 60	+2 17	28 77	34 72				
	1907	+ 12 48	S		52 25 60	+1 52	27 2	S		4 59 72	+2 6	61 88	34 76				
	1925	+ 22 24	S		54 45 83	+ 55	47 38	S		7 19 98	+2 17	22 15	34 77				
	2014	+ 35 1	N	Q − 1 60 (s)	6 9 56 9	−1 62	54 57	N	Q − 2 11 (s)	6 22 31 34	−2 05	29 29	12 34 72	m 2 34 7 3	+ 0 008	+ 0 028	12 34 739
	2021	+ 35 15	N		11 16 74	−1 62	15 12	N		23 51 88	−2 05	49 83	34 71				
	2110	+ 32 32	N		24 61 42	−1 63	59 79	N		37 36 52	−2 05	34 47	34 68				
	1971	+ 23 8	S		6 2 49 10	−1 64	47 46	S		6 15 24 21	−2 05	22 16	12 34 70	m s 12 34 717	+ 0 008	+ 0 038	12 34 763
	1986	+ 19 49	S		5 16 67	−1 66	15 01	S		17 51 75	−2 05	49 70	34 69				
	μ Gem	+ 22 34	S		16 4 20	−1 65	2 55	S		28 39 36	−2 05	37 31	34 76				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

AGRA (E) *Lat* 27° 10′ *Long* 5 12m 14 AND AMRITSAR (W) *Lat* 31 38′ *Long* 4h 59 39s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star Aspect	Instrumental Parts and Corrections	Mean Observed Time	Total Correction	Sum of Corrected Times	Transits Observed at W, By Barrard with Telescope No 1: Star Aspect	Instrumental Parts and Corrections	Mean Observed Time	Total Correction	Sum of Corrected Times	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrections for Personal Eq at $S_E - B_W = + 0^s 4$, $S_S - B_S = + 045$	$\Delta L - \rho$
1885					h					h m	s	s	m				
Dec 24	1830	+ 39 8	N	*I P W* d c − 1 3 b − 9 − 9 2 Q + 1 59	5 4 2 87	+ 1 58	14 45	N	*I P W* d − 2 8 b − 5 − 7 Q + 2	5 53 47 26	+ 1 89	49 5	2 34 70	s 34 635	+	+ 0 040	34 687
	1844	+ 37 6	N		43 12 29	+ 1 57	13 86	N		55 46 55	+ 1 89	48 44	34 58				
	1857	+ 33 53	N		45 3 63	+ 1 56	5 9	N		57 37 98	+ 9	39 89	34 7				
	1935	+ 37 58	N		57 9 75	+ 1 57	32	N		6 9 43 99	+ 89	45 88	34 56				
	1876	+ 20 5	S		5 47 34 7	+ 51	35 58	S		6 0 8 28	+ 1 92	1 2	12 34 62	s 34 63	+ 0 s	+ 0 045	34 680
	1896	+ 25 56	S		50 5 42	+ 1 54	52 96	S		3 5 70	+ 1 9	27 61	34 65				
	1907	+ 48	S		5 24 5	+ 1 5	6 00	S		4 58 63	+ 93	6 56	34 56				
	1925	+ 22 24	S		54 44 7	+ 1 53	46 25	S		7 18 99	+ 1 92	20 91	34 66				
	2014	+ 35 11	N	s Q − 1 59	6 9 55 06	− 1 6	53 44	N	Q − 2	6 22 30 5	− 2 3	28 9	2 34 75	s 34 3	+ 0 s	+ 0 040	34 55
	2083	+ 30 34	N		2 3 78	− 1 63	12 5	N		33 49 1	− 2 31	46 80	34 65				
	2110	+ 32 32	N		24 60 14	− 1 63	58 5	N		37 35 53	− 2 31	33 22	34 71				
	1971	+ 23 8	S		6 2 47 96	− 1 66	46 30	S		6 15 23 07	− 2 30	20 77	12 34 47	m s 2 34 563	+ 0 s	+ 0 045	34 620
	1986	+ 19 49	S		5 15 49	− 1 68	13 81	S		17 50 69	− 2 29	48 4	34 59				
	μ Gem.	+ 22 34	S		16 3 08	− 1 66	1 42	S		28 38 32	− 2 31	36 0	34 59				
	2067	+ 21 43	S		18 51 49	− 1 66	49 83	S		31 26 72	− 2 29	24 43	34 60				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

AGRA (E) *Lat 27° 10′ Long 5h 12m 14* AND AMRITSAR (W) *Lat 31 38′ Long 4 59 39s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, *By H a and with Telescope No 2*: Star Aspect	Instrumental Position and Correction Constant	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, *By St ah with Telescope No 1*: Star Aspect	Instrumental Position and Correction Constant	Mean Observed Time	Total Correction	Seconds of Corrected Time	Diff of Corrected Times (W − E): By each Star	Diff of Corrected Times (W − E): Mean of Group	Correction for Rate of E Clock	Corrns for Personal Equations $H_N - S_N = - 038$, $H_S - S_S = - 038$	$\Delta L - \rho$
1885					h m					h m	s		m s				
Dec 20	1830	+ 39 8	N	*I P E*	5 4 9 93	+1 54	1 47	N	*I P E*	5 53 43 46	+ 63	46 9	12 34 62	= 34 653	+ 0 6	− 0 8	34 641
	1844	+ 37 16	N	d −1 3	43 9 2	+1 52	10 64	N	d +	55 42 92	+2 48	4 40	34 76				
	1857	+ 33 53	N	b −2 −7 3	45 0 64	+ 54	2 8	N	b + 5 −127 1	57 34 58	+ 28	36 86	34 68				
	1935	+ 37 58	N	Q + 59	57 8 37	−0 04*	8 33	N	Q + 2 1	6 9 40 35	+2 53	42 88	34 55				
	1876	+ 20 15	S		5 47 31 13	+1 48	32 61	S		6 0 5 66	+1 55	7 21	2 34 60	= 34 53	+ 0 6	− 0 038	2 34 508
	1896	+ 25 56	S		50 48 5	+1 51	50 2	S		3 22 73	+1 83	24 56	34 54				
	1907	+ 48	S		5 2 63	+ 48	3	S		4 56 36	+	57 57	34 46				
	1925	+ 22 24	S		54 41 88	+1 48	43 36	S		7 16 23	+1 65	17 88	34 52				
	2014	+ 35 11	N	Q − 1 59	6 9 52 3	− 64	50 67	N	Q − 2 10	6 22 26 90	−1 85	25 05	12 34 38	= 12 34 5	+ 0 016	− 0 028	12 34 5 8
	2021	+ 35 15	N		11 12 69	− 65	1 4	N		23 47 39	−1 84	45 55	34 51				
	2082	+ 30 34	N		21 10 89	−1 67	9 22	N		33 45 92	−2 2	43 80	34 58				
	2110	+ 32 32	N		24 57 22	−1 64	55 58	N		37 32 20	−2 1	30 19	34 61				
	1971	+ 23 8	S		6 2 43 45	−0 09*	43 36	S		6 15 20 50	−2 51	17 99	12 34 63	= 2 34 635	+ 0 16	− 0 038	12 34 613
	1986	+ 19 49	S		5 1 84	−0 11	10 73	S		17 48 3	−2 66	45 47	34 4				
	μ Gem	+ 22 34	S		15 60 09	−1 69	58 40	S		28 35 58	−2 54	33 04	34 64				
	2067	+ 21 43	S		18 48 60	−1 69	46 91	S		31 24 02	−2 58	21 44	34 53				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off and consequently in these cases Q = 0 00

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES ΔL − ρ

AGRA (E) L t 27° 10′ Lo g 5 12m 14 AND AMRITSAR (W) L t 31 38′ Long 4h 59 39s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By H vud with T lesc pe N 2): Star Aspect	Instrumental Parts & Corrections	Mean Observed Time	Total Correction	Star's deduced Time	Transits Observed at W (By St h with T l cop N 1): Star Aspect	Instrumental Parts & Corrections	Mean Observed Time	Total Correction	Star's deduced Time	Difference of Corrected Time (W − E): By Star	Mean of Group	Correction for Rate of E Clock	Corrns for Personal Equations $H_E - S_W = -0^s.018$, $H_S - S_E = -0.038$	ΔL − ρ
1885					h m		s			h s			m s				
De 27	1830	+ 39 8	N	I P W	5 4 7 59	+ 84	9 43	N	I P W	5 53 44 4	− 09	44 5	12 34 72	m 34 685	+ 0 8	− 0 028	12 34 675
	1844	+ 37 6	N	d; c + 7; b + 3 4; − 9 8	43 6 99	+ 83	8 82	N	d; c − 2 8; b − 9; − 2	55 43 54	− 9	43 45	34 63				
	18 7	+ 33 53	N		44 58 35	+ 8	6 7	N		57 34 9	− 1	34 82	34 65				
	1935	+ 37 58	N	Q + 64	57 4 4	+ 84	6 4	N	Q 0 0	6 9 4 8	−	4 98	34 74				
	1876	+ 20 15	S		5 47 28 69	+ 1 74	30 43	S		6 0 5 44	− 0 17	5 27	12 34 84	m 34 8 5	+ 0 8	− 38	34 95
	1896	+ 25 56	S		5 45 9(	+ 77	47 73	S		3 2 79	− 0 5	64	34 9				
	1907	+ 48	S		5 9 5	+ 7	87	S		4 55 83	− 9	55 64	34 77				
	1925	+ 2 24	S		54 39 4	+ 74	4 15	S		7 16 04	− 0 15	15 89	34 74				
	2014	+ 35	N	s; Q − 64	6 9 49 77	− 46	48 3	N	Q	6 2 28 8	− 1	3 07	12 34 76	m 34 83	+ 0 8	− 0 28	1 34 773
	2021	+ 35 5	N		11 26	− 48	8 78	N		3 43 (2	− 0 1	43 5	34 73				
	2082	+ 3 34	N		2 8 46	− 48	6)8	N		33 4 93	−	4 8	34 83				
	2110	+ 32 32	N		24 54 85	− 1 49	53 36	N		37 8 29	− 0 1	8 7	34 8				
	1971	+ 23 8	S		6 2 42 74	− 53	4 21	S		6 5 6 5	− 15	6 00	2 34 79	m 1 34 803	+ 0 8	− 0 038	34 83
	1986	+ 9 49	S		5 10 23	− 1 54	8 69	S		17 43 68	− 0 16	43 52	34 83				
	μ G m	+ 22 34	S		5 57 73	− 53	56 2	S		8 3 5	− 7	30 98	34 78				
	2067	+ 21 43	S		18 46 16	− 1 54	44 62	S		31 19 59	− 0 6	19 43	34 81				

OF THE APPARENT DIFI ERENCE OF LONGITUDES ΔL — ρ

AGRA (E) *L t 2 10′ L g 6 12 14* AND AMRITSAR (W) *L t 31 38′ Lo g 4 59 39*

Astronomical Date	Star: B A C N mbe	Star: D l nat	Transits Observed at E, *By H d with T l pe No 2*: St Aspect	I t u ntal I t n and C rre t C t t	M Obse d T	T t l C t	S o d f C t d T	Transits Observed at W, *By Str h with T l s p No 1*: Aspect	I t t l I o t d C t n C t t	M Ob rv d T	T t l C t	S o l f C t T	D ff c f C rre ted Tim s (W − E): By s gl St	M f Gro p	C rre t n f Rat f E Clo k	C rm f P rs l Eq t $H_N - S_N$ = − o 38 H_S −	ΔL − ρ
1885					*h m*	*s*	*s*			*h m*			*m*				
D c 28	1830	+ 39 8	N	*I P E*	5 41 6 00	+ 53	7 53	N	*I P E*	5 53 4	− 3	42 2	34 69	m 34 6 8	+ o 8	− 8	34 668
	1844	+ 37 16	N	*d* − 3 3	43 5 30	+ 53	6 8	N	*d* + 1	55 39 45	+ 08	4 53	34 7				
	1857	+ 33 53	N	b − (− 7 7	44 (6	+ 5	58)	N	b 3 4 − 6 6	57 30 8	+ 2	3 58	34 ( )				
	1935	+ 37 58	N	Q + 1 63	57 2 7	+ 4	4 3	N	Q + 2	6 9 36 86	+ 8	38 94	34 63				
	1876	+ 20 15	S		5 47 27 08	+ 1 49	28 57	S		6 0 1 15	+ 2 4	3 19	34 6	m 34 6	+ 8	− 38	34 600
	1890	+ 25 56	S		5 44 43	+ 1 5	45)4	S		3 8 49	+ 2 03	0 52	34 58				
	1907	+ 48	S		5 7 44	+ 49	8)3	S		4 5 55	+	53 57	34 64				
	1925	+ 22 24	S		54 37 75	+ 1 5	39 25	S		7 85	+ 2 4	3 89	34 64				
	2014	+ 35 1	N	Q − 1 63	6 9 48 7	− 1 73	4(54	N	Q − *s* 1	6 22 23 41	− 2 16	2 25	2 34 7	m 34 658	+ o o 8	− o 8	34 648
	20 1	+ 35 5	N		8 8	− 3	7 7	N		23 43 8	− 2 5	4 66	34 59				
	2083	+ 30 34	N		21 6 99	− 5	5 24	N		33 4 6	− 8	39 88	34 64				
	2110	+ 32 32	N		4 53 34	− 1 74	51 60	N		37 8 45	− 2 6	26 29	34 69				
	1971	+ 23 8	S		6 2 40 98	− 1 76	39 22	S		6 15 16 15	− 2 18	13 97	12 34 75	m 2 34 685	+ o 8	− o 38	34 665
	1986	+ 9 49	S		5 8 54	− 77	6 7	S		7 43 62	− 2 8	4 44	34 67				
	μ G m	+ 34	S		15 56 5	− 6	54 49	S		28 9 6	− 0 08	29 08	34 59				
	2067	+ 2 43	S		18 44 65	− 77	42 88	S		31 9 80	− 2 19	7 6	34 73				

Owing to th irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off and consequently in these cases Q = 0 00

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

AGRA (E) *Lat* 27° 10′ *Long* 5h 12m 14 AND AMRITSAR (W) *Lat* 31 38′ *Long* 4 59m 39s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By H with Telescope No 2: Star Aspect	Instrumental Parameters and Corrections	Mean Observed Time	Total Correction	Sidereal Corrected Time	Transits Observed at W, By B with Telescope No 1: Star Aspect	Instrumental Parameters and Corrections	Mean Observed Time	Total Correction	Sidereal Corrected Time	Difference of Corrected Times (W − E): By Single Stars	Mean of Group	Correction for Rate of E Clock	Correction for Personal Equation $H_E - B_W = +$, $H_S - B = \pm 0\ 007$	$\Delta L - \rho$
1885					h m s	s	s			h m s	s	s	m				
D 29	1830	+ 39 8	N	*I P W*	5 41 8	+ 57	5 35	N	*I P W*	5 53 38 00	1 95	39 95	12 34 6	m 34 65	+	+ 0 ·	34 687
	1844	+ 37 (	N	d − 3 3	43 3 6	+ 1 57	4 (3	N	d − 8	55 37 4	+ 9(	3) 37	34 4				
	1857	+ 33 53	N	b − 4 − 5	44 54 4	+ 54	5(	N	b − 4 +	57 28 74	)7	3	34 7				
	1935	+ 37 58	N	Q + (	57 57	57	4	N	Q + 2 1	6 9 34 77	+ 95	36 7	34 58				
	1876	+ 2 5	S		5 47 24 83	+ 1 51	26 34	S		5 59 59 09	+ 1 97	(1 06	12 34 72	m 34 0	+ 0	+ 0 007	34 747
	1896	+ 25 6	S		5 4	+ 53	43 70	S		6 3 6 4(	+ 97	8 43	34 3				
	1907	+ 48	S		5 5 5	49	6 74	S		4 49 4(	+)8	5 44	34 70				
	1925	+ 2 24	S		54 35 53	+ 1 5	37 04	S		7 9 8	+ 1 97	77	34 73				
	2014	+ 35 1	N	Q − 6	6 9 45 98	− 68	44 3	N	Q − 2	6 2 4	− 2 23	19 0	12 34 7	m 34 48	+ 0 20	+ 0 ·	34 780
	2021	+ 35 15	N		11 6 47	− (8	4 9	N		34 84	− 2 3	39 6	34 8				
	2082	+ 3 34	N		21 4 73	− 6)	3 4	N		33 4 3	− 23	37 8	34 76				
	2110	+ 3 3	N		24 5 09	− 67	49 42	N		37 26 35	− 2 3	4	34 7				
	1971	+ 23 8	S		6 2 38 8	− 1 71	37 09	S		6 15 4 0	− 2 23	1 78	2 34 69	m 12 34 3	+ 0 00	+ 0 007	12 34 40
	1986	+ 9 49	S		5 6 39	− 71	4 68	S		17 4 48	− 2	39 26	34 58				
	μ Gem	+ 22 34	S		15 53 92	− 71	52 2	S		28 9 6	− 2 24	7 2	34 81				
	2067	+ 21 43	S		18 42 41	− 1 71	40 70	S		31 17 70	− 2 23	5 47	34 77				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

AGRA (E) *Lat* 2° 10′ *Long* 5 19ᵐ 14ˢ AND AMRITSAR (W) *Lat* 31 38′ *Long* 4ʰ 59ᵐ 39ˢ

Astronomical Date	Star: B A C Number	Star: Decl	Star Aspect	Transits Observed at E, By Strahan with Telescope No 2: Instrumental Parameters and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star Aspect	Transits Observed at W, By Heaviside with Telescope No 1: Instrumental Parameters and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Diff of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Personal Equations $S_E - H_W = +0\ 038$, $S_S - H_S = +0\ 038$	$\Delta L + \rho$
1885					h m	s	s			h m	s	s	m				
Dec 21	2338	+ 39 3	N	*I P W*	6 50 55 2	+ 67	56 79	N	*I P E*	3 29 4	+2 4	3 45	34 66	s 34 693	+ 0 020	+ 0 028	34 741
	2381	+ 41 5	N	d + 1 7	57 2 80	+1 68	14 48	N	d c + 1 2	9 47	+2 5	49 6	34 68				
	2416	+ 36 58	N	b − 8	7 1 31 81	+1 66	33 47	N	b + 8, a −2 6	14 6 6	+2 0	8 6	34 69				
	2429	+ 4 53	N	Q + 1 58	3 21 0	+1 68	22 69	N	Q + 1 87	15 55 38	+2 05	57 43	34 74				
	2330	+ 16 7	S		6 48 56 01	+1 56	57 57	S		7 1 30 48	+1 8	32 29	12 34 72	s 34 7	+ 0 020	+ 038	34 8
	2350	+ 24 19	S		52 37 00	+ 59	38 9	S		5 4	+1 89	3 3	34 7				
	2364	+ 25 5	S		54 49 89	+1 59	5 48	S		7 24 30	+1 9	26 2	34 7				
	2398	+ 16 45	S		58 38 73	+ 56	40 29	S		11 13 2	+1 82	15 2	34 73				
	2404	+ 32	N	Q − 1 58	7 8 55 93	−1 53	54 40	N	Q − 1 87	7 21 31 0	− 8	29 22	2 34 82	s 1 34 748	+ 0 0	+ 0 28	12 34 96
	2504	+ 35 8	N		18 13 14	−1 5	11 63	N		3 48	−1 76	46 31	34 68				
	2517	+ 32 16	N		19 45 76	−1 53	44 3	N		32 2 74	− 79	18 95	34 72				
	2563	+ 33 42	N		27 18 47	−1 52	16 95	N		39 53 49	−1 77	5 72	34 77				
	2473	+ 12 15	S		7 10 36 28	−1 62	34 66	S		7 23 11 34	−1 96	9 38	2 34 72	m 34 45	+ 2	+ 0 038	12 34 803
	2488	+ 15 53	S		14 3 95	− 60	2 35	S		26 39 5	−1 93	37 2	34 77				
	2493	+ 27 9	S		16 3 03	−1 56	1 47	S		28 38 6	−1 83	36 23	34 76				
	2537	+ 3 45	S		22 37 46	−1 6	35 85	S		35 12 53	−1 94	58	34 73				
Dec 22	2338	+ 39 3	N	*I P E*	6 5 5 9	+ 56	54 47	N	*I P W*	7 3 29 38	− 19	29 19	12 34 72	s 1 34 690	+ 0 1	+ 0 028	12 34 739
	2381	+ 4 5	N	d c − 3	57 6	+1 57	7	N	d c − 2 8	9 47	−0 8	46 84	34 67				
	2416	+ 36 58	N	b − 2 4, − 8 9	7 1 29 62	+1 5	3 17	N	b − 5 6, a −11 3	14 6 02	−0 20	5 82	34 65				
	2429	+ 40 53	N	Q + 1 59	3 18 77	+1 57	20 34	N	Q 0 00	15 55 24	−0 18	55 06	34 72				
	2364	+ 25 5	S		6 54 49 16	−0 07*	49 09	S		7 7 23 98	−0 24	23 74	12 34 65	s 2 34 650	+ 0 21	+ 0 038	12 34 709

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off and consequently in these cases Q = 0 00.

AGRA (E) Lat 27° 10 Long $5^h\ 12^m\ 14$ AND AMRITSAR (W) Lat 31 38′ Long 4 $59^m\ 39^s$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star Aspect	Instrumental Position and Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Heaviside with Telescope No 1: Star Aspect	Instrumental Position and Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Time (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Personal Equation $S_E - H_E = + 0\ 38$, $S_W - H_W = + 0\ 38$	$\Delta L + \rho$
1885					h m s	s	s		I P W	h m s	s		m				
D 22	2504	+ 35 8	N	I P E	7 8 10 95	− 1 64	9 3	N	d	7 30 44	− 0 2	44 1	12 34 7	m 34 30	+ 2	+ 0 28	1 34 9
	2517	+ 32 6	N	d c − 3	9 43 57	− 65	4 92	N	− 2 8 b − 5 6	32 16 89	− 22	6 67	34 75				
	2563	+ 33 42	N	b − 4 a − 8 9	27 16 29	− 1 65	4 64	N	− 1 3	39 49 59	− 2	49 38	34 74				
				s Q − 1 59					Q 0 00								
	2483	+ 15 53	S		7 14 1 4	− 69	0 5	S		7 26 35 03	− 0 26	34 77	12 34 72	m 34 7	+ 0	+ 38	34 7 9
	2403	+ 27 9	S		16 0 86	− 67	5) 9	S		8 34 5	− 3	33 92	34 73				
	2537	+ 3 45	S		35 9	− 69	33 60	S		35 8 58	− 0 7	8 3	34 7				
Dec 23	2338	+ 39 3	N	I P W	6 50 50 38	+ 6	5 99	N	I P E	7 3 24 6	+ 2	6 8	2 34 82	m 34 60	+	+ 8	34 809
	2381	+ 4 5	N	d c − 3	57 8	+ 62	9 73	N	d + 2	9 42 30	+ 2 21	44 51	34 8				
	2416	+ 36 58	N	b − 0 a − 9	7 27 2	60	28 72	N	b + − 4 5	14 1 23	+ 2 17	3 40	34 68				
	2429	+ 4 53	N	Q + 1 60	3 16 29	+ 62	7)	N	s Q + 2 11	15 6 46	+ 2 21	52 67	34 76				
	2330	+ 16 7	S		6 48 51 20	+ 1 53	52 73	S		7 25 37	+ 3	27 50	2 34 77	m 34 803	+ 0	+ 0 38	2 34 86
	2350	+ 24 19	S		52 32 2	+ 56	33 76	S		5 6 43	+ 2 7	8 60	34 84				
	2364	+ 25 5	S		54 45 08	+ 1 56	46 64	S		7 19	+ 7	1 39	34 75				
	2398	+ 16 45	S		58 33 84	+ 1 53	35 37	S		11 8 08	+ 2 14	1 22	34 85				
	2464	+ 32 1	N	s Q − 1 60	7 8 51 29	− 1 61	49 68	N	Q − 2 1	7 21 26 59	− 2 5	4 4	2 34 86	m 1 34 8 3	+ 0	+ 0 028	34 86
	2504	+ 35 8	N		18 8 49	− 1 60	6 89	N		30 43 73	− 2 05	4 68	34 79				
	2517	+ 32 16	N		19 41 16	− 1 61	39 55	N		32 16 39	− 2 05	14 34	34 79				
	2478	+ 12 15	S		7 10 31 60	− 1 68	29 92	S		7 23 6 87	− 09	4 78	34 86	m 34 8 5	+ 0 0	+ 0 038	34 9 4
	2493	+ 27 9	S		15 58 39	− 1 63	56 76	S		28 33 66	− 2 5	31 61	34 85				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) *Lat* 27 10′ *Long* 5ʰ 12ᵐ 14ˢ AND AMRITSAR (W) *Lat* 31 38′ *Long* 4 59ᵐ 39ˢ

Astronomical Date	Star: B.A.C Number	Star: Declination	Transits Observed at E (By St ahan, with Telescope No 2): Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By B rrard with Telescope No 1): Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrections for Personal Equation $S_N - B_N = + 0^s.040$, $S_S - B_S = + 0.45$	$\Delta L + \rho$
1885					h m s		s			h m		s	m s				
D 24	2338	+ 39 3	N	*I P E*	6 50 47 96	+ 1 59	49 55	N	*I P W*	7 3 22 6	+ 1 89	24 15	12 34 60	= 34 583	+ 0 22	+ 0 40	34 645
	2381	+ 41 5	N	d c − 0 3 b − 8 − 5 9	57 5 72	+ 1 6	7 33	N	d c − 2 8 b − 5 a − 3 7	9 40 06	+ 1 89	4 95	34 6				
	2416	+ 36 58	N		7 1 24 70	+ 1 59	26 29	N		13 58 96	+ 1 89	60 85	34 56				
	2429	+ 40 53	N	Q + 1 59	3 3 89	+ 6	15 50	N	Q + 2 10	15 48 16	+ 1 89	50 05	34 55				
	2330	+ 16 7	S		6 48 48 82	+ 1 53	50 35	S		7 1 22 99	+ 1 90	24 89	12 34 54	= 34 555	+ 0 2	+ 0 045	2 34 622
	2364	+ 25 5	S		54 42 67	+ 1 56	44 23	S		7 6 9	+ 1 89	18 80	34 57				
	2464	+ 32	N	Q − 1 59 (s)	7 8 48 96	− 1 60	47 36	N	Q − 2 (s)	7 21 24 17	− 2 29	21 88	12 34 52	= 1 34 643	+ 0 02	+ 0 040	2 34 705
	2504	+ 35 8	N		8 6 02	− 1 6	4 42	N		30 4 4	− 2 29	39 11	34 69				
	2517	+ 32 16	N		19 38 66	− 1 60	37 06	N		32 14 04	− 2 30	11 74	34 68				
	2563	+ 33 42	N		27 11 38	− 1 60	9 78	N		39 46 76	− 2 30	44 46	34 68				
	2473	+ 12 15	S		7 10 29 17	− 1 65	27 52	S		7 23 4 42	− 2 31	2 11	12 34 59	= 12 34 615	+ 0 022	+ 0 045	12 34 682
	2483	+ 5 53	S		13 56 85	− 1 65	55 20	S		26 32 13	− 2 30	29 83	34 63				
	2493	+ 27 9	S		15 55 95	− 1 62	54 33	S		28 31 26	− 2 3	28 95	34 62				
	2537	+ 13 45	S		22 30 39	− 1 65	28 74	S		35 5 67	− 2 31	3 36	34 62				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) *Lat* 27° 10′ *Long* 5h 12m 14s AND AMRITSAR (W) *Lat* 31 38′ *Long* 4h 59m 39s

Astronomical Date	Star: B.A.C. Number	Star: Declination	Transits Observed at E (By Heavinde with Telescope No 2): Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Strahan with Telescope No 1): Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Time (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Eq at ns $H_W - S_W = -0^s 28$, $H - S = -0\ 38$	$\Delta L + \rho$
1885					h m	s				h m		s	m s				
Dec 26	2338	+ 39 30	N	*I P W*	6 5 4 86	+ 55	44 4	N	*I P E*	7 3 6 86	+2 15	19	12 34 60	= 34 6 8	+ 0 2	− 0 028	= 34 6
	2381	+ 4 5	N	d c + 1 7	57 0 58	+ 57	2 5	N	d c + 1	9 34 6	+2 6	36 77	34 62				
	2416	+ 36 58	N	b − 7	7 1 9 53	+ 56	21 09	N	b − 3 7 5	13 53 59	+2 15	55 74	34 65				
	2429	+ 40 53	N	a (+ 5 / − 9) Q +1 s 59	3 8 75	+1 57	0 32	N	Q +2 0	5 42 76	+2 6	44 92	34 6				
	2330	+ 6 7	S		6 48 43 56	+ 58	45 14	S		7 17 7	+2	9 83	12 34 69	= 2 34 66	+ 22	− 0 038	2 34 649
	2364	+ 25 5	S		54 37 52	+1 56	39 8	S		7 59	+2 3	13 72	34 64				
	2464	+ 32 1	N	Q − 1 s 59	7 8 43 75	−1 6	42 4	N	Q 0 s 00	7 21 6 8	+0 04	16 85	12 34 7	= 34 663	+ 22	− 0 28	34 657
	2504	+ 35 18	N		8 0 9	−1 6	59 29	N		3 33 89	+ 05	33 94	34 65				
	2517	+ 32 6	N		9 33 5	− (	3 89	N		32 6 54	+ 04	6 58	34 69				
	2563	+ 33 42	N		27 6 35	− 61	4 74	N		39 39 3	+0 04	39 34	34 60				
	2473	+ 5	S		7 23 92	− (	3	S		7 22 56 97	+0 0	56 98	12 34 68	= 34 64	+ 0 22	− 0 038	34 624
	2483	+ 15 53	S		13 51 67	− 61	5 06	S		26 24 65	+ 0	24 66	34 60				
	2493	+ 27 9	S		5 5 8	−1 62	49 8	S		28 3 83	+0 03	23 86	34 68				
	2537	+ 13 45	S		22 25 22	− 6	23 6	S		34 8 2	+ 01	58 2	34 60				
Dec 27	2338	+ 39 3	N	*I P E*	6 50 40 20	+ 67	4 87	N	*I P W*	7 3 16 76	−0 08	16 68	12 34 8	= 34 830	+ 0 022	− 0 028	34 844
	2381	+ 4 5	N	d c − 3 3	56 57 92	+ 67	59 59	N	d c − 2 8	9 34 53	−0 06	34 47	34 88				
	2416	+ 36 58	N	b + 0 3 a −17 2	7 1 6 90	+1 64	18 54	N	b − 9 a −13 5	13 53 53	−0 08	53 45	34 9				
	2429	+ 40 53	N	Q +1 s 64	3 6 11	+1 67	7 78	N	Q 0 00	15 42 64	−0 06	42 58	34 80				
	2330	+ 16 7	S		6 48 41	+1 49	42 59	S		7 1 17 66	−0 2	17 45	12 34 86	= 2 34 913	+ 0	− 0 038	34 89
	2350	+ 24 19	S		52 22 02	+1 55	23 57	S		4 58 63	−0 16	58 47	34 90				
	2364	+ 25 5	S		54 34 88	+1 57	36 45	S		7 11 5	−0 16	11 35	34 90				
	2410	+ 22 11	S		7 0 10 09	+1 54	11 63	S		12 46 79	−0 7	46 62	34 99				

* This value has been used for stars 2330 and 2338; the other value −0 9 has been used for the rest.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) *L t 27° 10′ L g 6h 12m 14* AND AMRITSAR (W) *L t 31 38′ Lo g 4 59m 89*

Astronomical Date	Star: B A C Numb	Star: D cl at n	Transits Observed at E, *By He vand with T lescope No 2*: Sta Aspe t	I tru ental P ti n and C rre tion C t ts	Mean Ob erved T m	I t l C rr c t on	Sec nd of C rre t d Time	Transits Observed at W, *By St h with T les ope N 1*: Star A pect	I st um nt l P t on d C rr t C t t	M an Ob rv d T m	Tot l C rr c t	Seconds of C rr ct d T me	Differen e of Corr ted Time (W − E): By h Star	Me n of Group	C rrecti f Rate f W Clock	C rrns f Persl Equation $H_N - S_N = - 0\ 8$, $H_S - S_S = - 0\ 038$	ΔL + ρ
1885					h m s		s			h m s	s	s	m s				
D c 27	2464	+ 32 1	N	*I P E*	7 8 39 63	−0 04*	39 59	N	*I P W*	7 21 14 6	−0 13	14 47	12 34 88	= 34 835	+ 0 2	− 0 028	34 8 9
	2504	+ 35 8	N	*d* − 3 3	17 58 4	−1 65	56 76	N	*d* c − 2 8	30 31 70	−0 09	31 61	34 85				
	2517	+ 32 6	N	b 0 3 −17 2	9 3 04	−1 68	29 36	N	b − 9 a − 3 5	32 4 35	− 2	4 23	34 87				
	2563	+ 33 42	N	Q −1 64	27 2 18	−0 02	2 6	N	Q 0 00	39 37 0	−0 11	36 90	34 4				
	2473	+ 12 5	S		7 10 19 98	−0 17*	19 81	S		7 22 54 97	−0 23	54 74	12 34 93	= 34 938	+	− 0 38	34 9 2
	2483	+ 15 53	S		13 49 24	−1 78	47 46	S		26 2 62	−0 2	22 42	34 96				
	2493	+ 7 9	S		15 48 26	−1 7	46 54	S		28 2 7	−0 5	21 56	35 0				
	2537	+ 13 45	S		22 22 79	−1 8	20 99	S		34 56 03	−0 2	55 83	34 84				
D 28	2338	+ 39 3	N	*I P W*	6 50 37 49	+1 85	39 34	N	*I P E*	7 3 11 95	+2 0	14 5	12 34 7	= 34 668	+ 0 3	− 0 28	1 34 663
	2381	+ 41 5	N	*d* + 1 7	56 55 22	+1 85	57 7	N	*d* c + 1 2	9 9 68	+	3 78	34				
	2416	+ 36 58	N	b + −18 8	7 1 14 18	+ 80	5 98	N	b − 3 4 a −1 9	3 48 6	2 7	50 69	34 7				
	2429	+ 40 53	N	Q + 63	3 3 38	+ 87	5 25	N	Q +2 11	15 37 7	+2 9	39 79	34 54				
	2330	+ 16 7	S		6 48 38 39	1 6	4 00	S		7 2 74	+2 00	4 74	1 34 74	= 12 34 7 8	+ 0 023	− 0 038	1 34 703
	2350	+ 24 9	S		52 19 39	+ 67	2 06	S		4 53 72	+2 03	55 75	34 69				
	2364	+ 25 5	S		54 32 2	+1 69	33 90	S		7 6 6	+2 1	8 62	34 72				
	δ Gem	+ 22 11	S		7 0 7 44	+1 66	9 10	S		12 41 81	+2 01	43 82	34 72				
	2464	+ 32 1	N	Q − 1 63 (s)	7 8 38 53	−1 52	37 01	N	Q 0 00 (s)	7 21 89	−0 05	11 84	12 34 83	= 12 34 760	+ 0 023	− 0 028	12 34 755
	2504	+ 35 8	N		17 55 71	−1 48	54 3	N		30 28 98	−0 04	28 94	34 71				
	2517	+ 32 6	N		9 8 38	−1 5	26 87	N		32 1 72	− 06	1 66	34 79				
	2563	+ 33 42	N		26 61 07	−1 49	59 58	N		39 34 33	−0 04	34 29	34 71				
	2473	+ 12 15	S		7 10 18 90	−1 67	17 23	S		7 22 52 16	−0 13	52 03	12 34 80	= 12 34 795 (s)	+ 0 023	− 0 038	12 34 780
	2483	+ 15 53	S		13 46 56	−1 65	44 91	S		26 19 75	−0 11	19 64	34 73				
	2493	+ 27 9	S		15 45 55	−1 56	43 99	S		28 19 00	−0 08	18 92	34 93				
	253	+ 13 45	S		22 20 09	−1 66	18 43	S		34 53 26	−0 1	53 15	34 72				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) Lat 27° 10′ Long 5h 12m 14s AND AMRITSAR (W) Lat 31 38′ Long 4h 59m 39s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By H … with Telescop No 2: Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Burr … d with Telescop N 1: Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. fo Persl. Eq tions $H_E - B_E = + 0^s\ 2$, $H_S - B_S = + 0\ 007$	$\Delta L + \rho$
1885					h m	s				h m s	s		m s				
Dec. 29	2338	+ 39 30	N	I P E	6 50 34 93	+ 1 84	36 77	N	I P W	7 3 9 5	+ 1 98	11 49	12 34 72	= 12 34 5	+ 0 2	+ 0 012	2 34 739
	2381	+ 41 5	N	d c + 1 7	56 52 71	+ 1 86	54 57	N	d c − 2 8	9 27 25	+ 1 98	29 23	34 66				
	2416	+ 36 58	N	b + 1 1 − 22 7	7 1 11 72	+ 1 81	3 53	N*	b − 2 4 a − 7 5	13 46 24	+ 1 99	48 23	34 70				
	2429	+ 40 53	N	s Q + 1 63	5 0 86	+ 1 86	2 72	N	s Q + 2 10	15 35 48	+ 1 98	37 46	34 74				
	2330	+ 16 7	S		6 48 35 94	+ 1 60	37 54	S		7 1 10 3	+ 1 93	12 24	12 34 70	= 2 34 5	+ 0 022	+ 0 007	1 34 734
	2350	+ 24 9	S		52 16 9	+ 1 66	8 56	S		4 5 3	+ 1 95	53 25	34 69				
	2364	+ 25 5	S		54 29 74	+ 67	3 41	S		7 4 6	+ 94	6 0	34 69				
	δ Gem.	+ 22 1	S		60 4 95	+ 1 64	6 59	S		12 39 40	+ 1 93	41 33	34 74				
	2464	+ 32	N	Q − 1 63	7 8 36 09	− 1 5	34 58	N	s Q − 2 10	7 2 11 43	− 2 23	9 20	2 34 62	= 2 34 700	+ 0 22	+ 0 012	12 34 734
	2504	+ 35 18	N		17 53 19	− 1 47	51 72	N		30 28 68	− 2 21	26 47	34 75				
	2517	+ 32 16	N		19 25 88	− 1 51	24 37	N		31 6 26	− 2 22	59 04	34 67				
	2563	+ 33 4	N		26 58 56	− 1 48	57 8	N		39 34 06	− 2 22	1 84	34 76				
	2473	+ 12 15	S		7 10 16 45	− 1 70	14 75	S		7 22 51 63	− 2 30	49 33	12 34 58	= 12 34 6 8	+ 0 022	+ 0 007	1 34 707
	2483	+ 15 53	S		13 44 05	− 1 67	42 38	S		26 19 37	− 2 26	17 11	34 73				
	2496	+ 27 9	S		15 43 06	− 1 56	41 50	S		28 18 50	− 2 24	16 26	34 76				
	2537	+ 13 45	S		22 17 64	− 1 69	15 95	S		34 52 87	− 2 28	50 59	34 64				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AMRITSAR (E) *Lat* 31 38′ *Long* $4^h\ 59^m\ 39^s$: AND MOOLTAN (W) *Lat* 30° 11 *Long* $4^h\ 45^m\ 56$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Strahan, with Telescope No 2): Stars Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equation $B_N - S_N = -0^s\ 18$, $B_S - S_S = -0\ 63$	$\Delta L - \rho$
1886					h m s		s			h m s	s	s	m s				
Jan 5	1947	+ 38 6	N	I P W	5 58 16 94	−0 14	16 80	N	I P W	6 12 0 99	+0 04	1 03	13 44 23	m 3 44 300	+ 0 06	− 0 8	13 44 243
	2014	+ 35 11	N	d c − 3 1	6 8 30 66	−0 15	30 51	N	d c − 0 4	22 14 83	+0 03	14 86	44 35				
	2021	+ 35 15	N	b − 3 2 a − 7 1	9 51 18	−0 15	51 3	N	b + 0 5 a −10 3	23 35 34	+0 03	35 37	44 34				
	2082	+ 30 34	N	Q s 0 00	19 49 45	−0 17	49 28	N	Q +1 66	33 33 56	0 00	33 56	44 28				
	1971	+ 23 8	S		6 1 23 48	−0 19	23 29	S		6 15 7 65	−0 03	7 62	13 44 33	m 3 44 355	+ 0 06	− 0 63	13 44 253
	1986	+ 19 49	S		3 51	−0 17	5 84	S		17 35 29	−0 05*	35 24	44 40				
	2047	+ 22 34	S		14 38 65	− 9	38 46	S		28 22 87	− 3	22 84	44 38				
	2067	+ 21 43	S		17 27 09	−0 18	26 91	S		31 9 60	+1 62	11 22	44 31				
	2139	+ 38 32	N	Q s 0 00	6 27 17 64	−0 14	17 50	N	Q s 0 00	6 41 1 79	+0 04	1 83	13 44 33	m 13 44 403	+ 0 061	− 0 8	13 44 346
	2156	+ 40 0	N		29 27 85	−0 13	27 72	N		43 12 00	+ 5	12 05	44 33				
	2228	+ 41 55	N		41 17 30	−0 15	17 15	N		55 1 56	+0 07	1 63	44 48				
	2237	+ 34 6	N		43 51 39	−0 16	51 23	N		57 35 68	+0 02	35 70	44 47				
	2173	+ 19 46	S		6 31 52 77	−0 9	52 58	S		6 45 37 11	−0 05	37 06	13 44 48	m s 13 44 413	+ 0 061	− 0 163	13 44 311
	2191	+ 17 46	S		34 20 80	−0 19	20 61	S		48 5 08	−0 5	5 03	44 42				
	2199	+ 13 21	S		36 8 32	−0 21	8 11	S		49 52 61	−0 07	52 54	44 43				
	2208	+ 12 49	S		38 4 84	−0 20	4 64	S		51 49 03	−0 07	48 96	44 32				
Jan 6	2014	+ 35 11	N	I P E	6 8 22 21	+1 84	24 05	N	I P W	6 22 6 96	+1 67	8 63	13 44 58	m 13 44 530	+ 0 047	− 0 118	13 44 459
	2021	+ 35 15	N	d c + 1 5 b + 0 8	9 42 73	+1 84	44 57	N	d c − 0 4	23 27 39	+1 67	29 06	44 49				
	2082	+ 30 34	N	a −17 2 Q s +1 75	19 4 92	+1 80	42 72	N	b − 0 4 β − 7 4 Q s +1 67	33 25 59	+1 65	27 24	44 52				
	1971	+ 23 8	S		6 1 15 07	+1 75	16 82	S		6 15 1 38	−0 04*	1 34	13 44 52	m s 13 44 473	+ 0 047	− 0 163	13 44 357
	1986	+ 19 49	S		3 42 81	+1 72	44 53	S		17 28 96	−0 05*	38 91	44 38				
	2047	+ 22 34	S		14 30 31	+1 75	32 06	S		28 14 91	+1 63	16 54	44 48				
	2067	+ 21 43	S		17 18 68	+1 73	20 41	S		31 3 29	+1 63	4 92	44 51				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AMRITSAR (E) *Lat* 31 38′ *Long* 4h 59m 39s AND MOOLTAN (W) *Lat* 30° 11 *Long* 4h 45m 56s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burr rd with T lescop No 1): Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By St ahan with Telescope No 2): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	(W − E): Mean of Group	Correction for Rate of E Clock	Corrns fo Pers Equatn as $B_E - S_K = -0^s 8$, $B_E - S_S = -0\ 63$	ΔL − ρ
1886					h m	s				h m	s		m s				
Jan 6	2139	+ 38 32	N	*I P E*	6 7 6	− 63	10 99	N	*I P W*	6 40 57 13	− 1 66	55 41	13 44 48	m s 13 44 490	+ 0 047	− 0 18	13 44 49
	2156	+ 40 0	N	d c + 5	29 22 84	− 1 60	21 24	N	d c − 0 4	43 7 37	− 1 66	5 71	44 47				
	2223	+ 4 55	N	b + 0 8 a − 7 2	41 12 23	− 1 57	66	N	b − 0 4 − 7 4	54 56 83	− 1 65	55 8	44 52				
	2237	+ 34 6	N	s Q − 1 75	43 46 48	− 1 66	44 82	N	s Q − 1 67	57 30 99	− 1 68	29 31	44 49				
	2191	+ 17 46	S		6 34 5 91	− 1 79	14 2	S		6 47 60 39	− 1 72	58 67	13 44 55	m 3 44 537	+ 0 047	− 0 163	13 44 421
	2199	+ 3 2	S		36 3 48	− 1 82	1 66	S		49 46 28	− 0 06	46 2	44 56				
	2208	+ 2 49	S		37 59 94	− 1 81	58 13	S		51 42 70	− 0 07	42 63	44 50				
Jan 9	1947	+ 38 6	N	*I P E*	5 57 58 22	+ 1 79	60 01	N	*I P E*	6 1 42 56	+ 1 59	44 15	13 44 4	m 3 44 243	+ 028	− 0 8	3 44 153
	2014	+ 35 1	N	d c + 1 5	6 8 11 91	+ 1 77	13 68	N	d c − 1 2	21 56 39	+ 1 58	57 97	44 29				
	2021	+ 35 15	N	b + 3 a − 3 9	9 32 43	+ 1 77	34 20	N	b − 2 a − 7 7	23 16 84	+ 1 58	18 42	44 22				
	2082	+ 30 34	N	s Q + 1 72	19 30 66	+ 77	32 43	N	s Q + 1 62	33 15 19	+ 1 56	16 75	44 32				
	1986	+ 19 49	S		6 3 32 36	+ 1 75	34 11	S		6 17 16 73	+ 1 53	18 26	3 44 15	m 3 44 210	+ 0 028	− 0 163	3 44 075
	2047	+ 22 34	S		14 19 96	+ 1 75	21 71	S		28 4 41	+ 53	5 94	44 23				
	2067	+ 21 43	S		17 8 32	+ 1 75	10 07	S		30 52 80	+ 1 52	54 32	44 25				
	2139	+ 38 32	N	s Q − 1 72	6 27 2 40	− 1 65	0 75	N	s Q − 1 62	6 40 46 67	− 1 66	45 01	13 44 26	m 13 44 2	+ 0 028	− 0 118	3 44 20
	2156	+ 40 0	N		29 12 63	− 1 64	1 99	N		42 56 82	− 1 65	55 17	44 18				
	2223	+ 4 55	N		41 2 11	− 1 64	0 47	N		54 46 26	− 1 64	44 62	44 5				
	2237	+ 34 6	N		43 36 15	− 1 67	34 48	N		57 20 40	− 1 67	18 73	44 25				
	2173	+ 19 46	S		6 31 37 52	− 1 69	35 83	S		6 45 21 83	− 1 71	20 2	13 44 29	m 13 44 290	+ 0 028	− 0 63	13 44 55
	2191	+ 17 46	S		34 5 59	− 1 69	3 90	S		47 49 93	− 1 72	48 21	44 31				
	2199	+ 13 21	S		35 53 11	− 1 70	51 41	S		49 37 47	− 1 73	35 74	44 33				
	2208	+ 12 49	S		37 49 54	− 1 69	47 85	S		51 33 82	− 1 74	32 08	44 23				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off and consequently in these cases Q = 0 00.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AMRITSAR (E) *Lat 31 38', Lo g 4 59 39* AND MOOLTAN (W) *Lat 30° 11 Long 4 45m 56s*

Astronomical Date	Star		Transits Observed at E — *By B rr rd with Telescope No 1*					Transits Observed at W — *By Strah w th T l scope No 2*					D ffere ce of Corrected Times (W − E)		Rate of Correcti n f E Clock	C rrn fo P rsl. Equations $B_N - B_S = - \cdot 8$, $B_S - B_S = - 0\ 163$	ΔL − ρ
	B A C Number	D cli nati n	Star A pect	In tru ental Pos tion and Correction Co sta ts	Mean Observed Time	Tot l Correc t n	Seconds of Corre t ed T m	Star Aspect	I trumental Pos tion and Co rect on Constant	Mean Ob ved Time	Total C rrec ti	Seconds of C rrect ed Time	By each Star	M of Gro p			
					h m s	s	s			h m s	s	s	m s				
1886 Jan 10	2014	+ 35 1	N	*I P W*	6 8 9 59	+1 66	11 25	N	*I P E*	6 21 54 06	+ 55	55 61	13 44 36	m 3 44 380	+ 0 022	− 0 1 8	13 44 284
	2021	+ 35 15	N	d c − 3 1	9 30 07	+1 66	31 73	N	d c − 1 2	23 14 60	+1 57	16 17	44 44				
	2082	+ 30 34	N	b + 0 7 a −10 5	19 28 40	+1 65	30 05	N	b ¬ 8 a − 7 4	33 12 83	+1 56	14 39	44 34				
				s Q + 1 71					s Q + 1 63								
	1980	+ 19 49	S		6 3 30 06	+ 61	3 67	S		6 17 14 45	+1 5	15 96	13 44 29	m 3 44 3 0	+ 0 0 2	− 0 163	3 44 69
	2047	+ 22 34	S		14 17 71	+1 61	19 32	S		28 2 13	+1 52	3 65	44 33				
	2067	+ 21 43	S		17 6 10	+1 6	7 71	S		30 50 49	+ 53	52 02	44 3				
	2139	+ 38 32	N	s Q − 1 71	6 26 60 9	−1 73	58 36	N	s Q − 1 63	6 40 44 4	−1 69	42 72	3 44 36	m 3 44 393	+ 0 2	− 0 118	13 44 29
	2156	+ 40 0	N		29 10 34	−1 73	8 6	N		42 54 69	− 68	53 01	44 4				
	2223	+ 41 55	N		40 59 74	−1 73	58 1	N		54 44 06	−1 66	42 40	44 39				
	2237	+ 34 6	N		43 33 87	−1 76	32 11	N		57 18 23	− 70	6 53	44 42				
	2173	+ 19 46	S		6 31 35 31	−1 82	33 49	S		6 45 19 6	−1 75	17 86	13 44 37	m 3 44 338	+ 0 22	− 0 163	3 44 97
	2191	+ 17 46	S		34 3 38	−1 84	1 54	S		47 47 62	− 75	45 87	44 33				
	2199	+ 13 21	S		35 5 90	−1 85	49 5	S		49 35 2	−1 75	33 37	44 32				
	2208	+ 12 49	S		37 47 34	−1 85	45 49	S		51 3 57	− 7	29 82	44 33				
J 12	1947	+ 38 6	N	*I P W*	5 57 51 50	+1 71	53 21	N	*I P W*	6 11 35 95	+1 70	37 65	13 44 44	m 13 44 468	+ 0 020	− 0 118	13 44 370
	2014	+ 35 11	N	d c − 3 1	6 8 5 22	+1 68	6 90	N	d c − 0 4	21 49 76	+1 70	51 46	44 56				
	2021	+ 35 15	N	b + 1 a − 4 4	9 25 85	+1 68	27 53	N	b + 1 1 a − 4 6	23 0 29	+1 71	12 00	44 47				
	2082	+ 30 34	N	s Q + 1 72	19 24 06	+1 67	25 73	N	s Q + 1 67	33 8 44	+1 69	10 13	44 40				
	1971	+ 23 8	S		6 0 58 21	+1 61	59 82	S		6 14 42 67	+1 68	44 35	13 44 53	m s 13 44 448	+ 0 020	− 0 163	13 44 305
	1986	+ 19 49	S		3 25 75	+1 61	27 36	S		17 10 11	+1 68	1 79	44 43				
	2047	+ 22 34	S		14 13 38	+1 61	14 99	S		27 57 76	+1 66	59 42	44 43				
	2067	+ 21 43	S		17 1 80	+1 59	3 39	S		30 46 12	+1 67	47 79	44 40				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AMRITSAR (E) *Lat 31° 38′ Long 4ʰ 59ᵐ 39ˢ* AND MOOLTAN (W) *Lat 30° 11 Long 4ʰ 45ᵐ 56ˢ*

Astronomical Date	Star: B A C Numbe	Star: Decli nation	Transits Observed at E (By B rrard with T lescope No 1): Star Aspect	I trum ntal P ti n and Correction Con ta ts	Mean Observed Time	Total Correc tion	Sec nd f C rre t ed T m	Transits Observed at W (By St ahan with T lescope No 2): Star Aspe t	In trum ntal P s t d Correct on C t nt	Mean Obs ed Time	Total C rrec tion	Seconds of C rect ed T m	Difference of Corrected Times (W − E): By each Star	Mean f Group	Correction f Rate of E Clock	Corrns. for Persl. Equati ns $B_E - S_W = -0^s\ 8$, $B_S - B_E = -0\ 63$	ΔL − ρ
1886				*I P W*	h m	s			*I P W*	h m s	s		m s				
Jan 12	2139	+ 38 32	N	d	6 26 55 77	−1 72	54 05	N	d	6 4 40 05	−1 64	38 41	13 44 36	= 3 44 358	+ 0 20	− 0 118	3 44 260
	2156	+ 40 0	N	c − 3 1 b + 1 0	29 5 95	− 7	4 25	N	c − 0 4 b + 1	42 50 2	−1 62	48 59	44 34				
	2223	+ 4 55	N	a − 4 4	40 55 40	−1 70	53 70	N	a − 4 6	54 39 68	−1 62	38 06	44 36				
	2237	+ 34 6	N	s Q − 1 72	43 29 53	−1 75	27 78	N	Q −1 67	57 13 79	−1 64	12 15	44 37				
	2173	+ 19 46	S		6 31 30 93	−1 85	29 08	S		6 45 15 24	−1 67	13 57	13 44 49	= 3 44 4 8	+ 0 20	− 0 163	3 44 335
	2191	+ 17 46	S		33 59 3	−1 86	57 7	S		47 43 7	−1 69	4 58	44 41				
	2199	+ 13 2	S		35 46 56	−1 88	44 68	S		49 30 8	−1 68	29 14	44 46				
	2208	+ 12 49	S		37 42 9	−1 88	4 09	S		51 27 23	−1 69	25 54	44 55				
Ja 14	1947	+ 38 6	N	*I P E*	5 57 47 48	+1 54	49 02	N	*I P W*	6 11 31 71	+1 66	33 37	13 44 35	= 3 44 360	+ 0 20	− 0 8	13 44 6
	2014	+ 35 1	N	d c − 3 5	6 8 1 22	+ 53	2 75	N	d c − 1 4	2 45 53	+1 65	47 8	44 43				
	2021	+ 35 5	N	b − 6 1 a −14 2	9 21 86	+1 53	23 39	N	b − 9 + 3	23 6 7	+1 65	7 72	44 33				
	2082	+ 30 34	N	s Q + 1 76	19 20 01	+1 52	2 53	N	Q + 1 72	33 4 2	+ 65	5 86	44 33				
	1971	+ 23 8	S		6 0 54 20	+1 46	55 66	S		6 14 38 37	+1 66	40 03	3 44 37	= 3 44 420	+ 0 020	− 0 163	13 44 277
	1986	+ 19 49	S		3 2 58	+1 46	3 4	S		17 5 9	+1 66	7 57	44 53				
	2047	+ 22 34	S		14 9 31	+1 46	10 77	S		27 53 52	+1 66	55 18	44 41				
	2067	+ 21 43	S		16 57 71	+1 45	59 6	S		3 4 87	+1 66	43 53	44 37				
	2139	+ 38 32	N	s Q − 1 76	6 26 51 69	−1 98	49 71	N	s Q − 1 2	6 40 35 90	−1 78	34 12	13 44 41	= 3 44 3 8	+ 0 020	− 0 118	13 44 60
	2156	+ 40 0	N		28 61 94	−1 97	59 97	N		42 46 20	−1 79	44 41	44 44				
	2223	+ 4 55	N		40 51 47	−1 96	49 51	N		54 35 63	−1 79	33 84	44 33				
	2237	+ 34 6	N		43 25 57	−2 00	23 57	N		57 9 61	−1 9	7 82	44 25				
	2173	+ 19 46	S		6 31 26 95	−2 06	24 89	S		6 45 1 1	−1 78	9 33	3 44 44	= 3 44 3 3	+ 0 020	− 0 63	3 44 30
	2191	+ 17 46	S		33 55 04	−2 08	52 96	S		47 39 08	−1 78	37 30	44 34				
	2199	+ 13 21	S		35 42 60	−2 09	40 51	S		49 26 63	−1 78	24 85	44 34				
	2208	+ 12 49	S		37 38 99	−2 09	36 90	S		5 23 05	−1 78	21 27	44 37				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

AMRITSAR (E) *L t 31 38' Long 4h 59m 39s* AND MOOLTAN (W) *Lat 30° 11 Long 4h 45m 56s*

Astronomical Date	Star		Transits Observed at E — *By B rrard with T lescope No 1*					Transits Observed at W — *By Heavinde with Telescope No 2*					Diff ce of Corrected Times (W − E)		C rrecti n for Rate of E Clock	Corrns. f Persl. Equatn n $B_N - H_N = -0^s\ 5$, $B_S - H_S = -0\ 37$	ΔL − ρ
	B A C Number	Decl n t	Star Aspect	I t i ntal Posit on and Corr ct on C t ts	Mean Obs rv d Time	Total C rrec t n	Second of C rrect d Time	Star A pect	I strum ntal Pos t o and Corre t on C n tant	Me n Ob e ed Tim	Total Corr c tion	Seconds f Correct d T me	By each Star	Mean of Group			
1886					h m s		s			h m	s		m s				
Jan 19	1947	+ 38 6	N	*I P E*	5 57 37 34	+1 00	38 34	N	*I P E*	6 11 20 74	+1 85	22 59	3 44 25				
	2014	+ 35 11	N	d − 3 5	6 7 51 25	+0 99	52 24	N	d c − 0 2	21 34 57	+1 83	36 40	44 16	= 3 44 38	+ 021	− 0 05	3 44 54
	2021	+ 35 15	N	b − 3 2 a −2 9	9 11 67	+0 99	12 66	N	b − 2 2 a −11 8	22 55 1	+1 83	56 94	44 28				
	2082	+ 30 34	N	s Q + 1 41	19 9 87	+0 97	10 84	N	s Q + 1 87	32 53 30	+1 80	55 10	44 26				
	1971	+ 23 8	S		6 0 43 95	+0 94	44 89	S		6 14 27 41	+1 77	29 18	13 44 29	= 3 44 90	+	− 37	13 44 74
	2130	+ 38 32	N	s Q − 1 41	6 26 41 01	−1 80	39 21	N	s Q − 1 87	6 40 25 30	− 88	23 42	13 44 21				
	2156	+ 40 0	N		28 51 17	−1 82	49 35	N		42 35 47	−1 88	33 59	44 24	= 13 44 258	+ 0 21	− 0 5	13 44 174
	2228	+ 41 55	N		40 40 62	−1 79	38 83	N		54 25 00	−1 88	23 12	44 29				
	2237	+ 34 6	N		43 14 77	−1 84	12 93	N		56 59 14	−1 92	57 22	44 29				
	2191	+ 17 46	S		6 33 44 16	−1 91	42 25	S		6 47 28 53	−1 99	26 54	13 44 29				
	2199	+ 13 21	S		35 31 79	−1 93	29 86	S		49 16 09	−2 01	14 08	44 22	= 13 44 243	+ 0 021	− 0 137	13 44 127
	2208	+ 12 49	S		37 28 24	− 93	26 31	S		51 12 54	−2 01	10 53	44 22				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AMRITSAR (E) *Lat* 31 38′ *Long* 4 59ᵐ 39ˢ AND MOOLTAN (W) *Lat* 30° 11 *Long* 4ʰ 45ᵐ 56ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl. Equations $B_N - S_N = -0^s\ 8$, $B_S - S_S = -0\ 63$	$\Delta L + \rho$
1886					*h m*					*h m*			*m s*				
Jan 5	2381	+ 41 5	N	*I P W*	6 56 2 96	+ 6	23 57	N	*I P W*	7 6 36	+1 76	8 12	3 44 55	s 3 44 555	− 0 006	− 0 118	3 44 42
	2416	+ 36 58	N	*d* c − 3	7 0 4 9	+ 6	4 52	N	*d* c − 0 4	14 25 38	+1 72	27 10	44 58				
	2429	+ 40 53	N	b − 3 − 3	2 3 22	+ 6	3 83	N	b + 5 − 7	16 4 64	+1 76	6 40	44 57				
	2464	+ 32 1	N	Q + 1 74	8 2 03	+1 57	3 60	N	Q + 1 66	2 46 44	+1 68	48 12	44 52				
	2364	+ 5 5	S		6 53 58 9	+ 54	6 44	S		7 7 44 98	− 04	44 94	3 44 50	s 3 44 575	− 0 006	− 0 63	3 44 396
	3 G m	+ 22 12	S		59 34 08	+ 52	35 60	S		13 18 68	+ 6	20 28	44 68				
	2442	+ 28 2	S		7 4 54	+1 54	55 54	S		18 38 44	+ 64	40 08	44 54				
	2473	+ 2 5	S		9 42 33	+ 48	43 8	S		23 26 85	+1 54	28 39	44 58				
	2489	+ 3 3	N	Q − *s* 74	4 2 9	− 9	00	N	Q − 66	7 27 55 5	+0	55 53	3 44 53	s 3 44 5 3	− 0 016	− 0 8	3 44 3 9
	2504	+ 35 18	N		7 2 75	− 88	2 87	N		31 7 05	− 62	5 43	44 56				
	2517	+ 3 6	N		8 55 44	− 9	53 54	N		3 37 99	+0	38 0	44 47				
	2563	+ 33 42	N		26 28 21	−1 89	26 32	N		40 2 44	−1 63	10 81	44 49				
	2587	+ 3 45	S		7 47 0	− 98	45 2	S		7 35 3 44	−1 78	9 66	13 44 54	s 3 44 5 3	− 6	− 0 163	3 44 394
	2617	+ 27 4	S		32 49 93	− 93	48 00	S		46 32 57	−0 02	32 55	44 55				
	2632	+ 20 11	S		35 9 46	− 95	17 51	S		49 2 16	−0 07	2 09	44 58				
	2639	+ 16 6	S		36 49 88	−1 99	47 89	S		50 32 61	−0 10	32 51	44 62				
Jan. 6	2381	+ 41 5	N	*I P E*	6 56 23 48	+1 89	25 37	N	*I P W*	7 10 9 83	+0 08	9 91	13 44 54	s 3 44 530	− 0 014	− 0 118	3 44 398
	2416	+ 36 58	N	*d* c + 1 5	7 0 42 46	+1 84	44 30	N	*d* c − 0 4	14 27 02	+1 73	28 75	44 45				
	2429	+ 4 53	N	b + 0 8 a −18 1	2 3 49	+1 89	33 38	N	b − 0 4 −17 8	16 6 29	+1 76	18 5	44 67				
	2464	+ 32 1	N	*s* Q + 1 73	8 3 61	+1 79	5 40	N	*s* Q + 1 69	21 48 17	+1 69	49 86	44 46				
	2364	+ 25 5	S		6 54 0 46	+1 74	2 20	S		7 7 45 07	+1 63	46 70	13 44 50	s 3 44 440	− 0 04	− 0 63	13 44 63
	2442	+ 28 2	S		7 4 55 54	+1 77	57 31	S		18 40 12	+ 65	41 77	44 46				
	2473	+ 12 15	S		9 43 94	+1 66	45 60	S		23 30 10	−0 14	29 96	44 36				

*Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off and consequently in these cases Q = 0 00.

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

AMRITSAR (E) *Lat 31 38′ Long 4h 59m 89s* AND MOOLTAN (W) *Lat 30° 11 Long 4h 45m 56s*

Astronomical Date	Star: B A C Numbe	Star: Decli nati	Transits Observed at E, By Burrard with Telescope No 1: Star' Aspect	In trumental Position and Correction Co stants	Mean Observed Time	Total Corre tion	Seconds f Co re t ed Time	Transits Observed at W, By Str han w th T l ops No 2: Star Aspect	I strum ntal Po tion nd Corre tion C nstants	Me n Observed Time	Total C r c tion	Seconds f C rrect d Time	Difference of Correct d Tim s (W − E): By each Star	Difference of Correct d Tim s (W − E): M an of Group	Correction for Rate of W Clock	Corrn for Persl Equations $B_E - S_E = - 0^s 118$, $B_S - S_S = - 0\ 163$	$\Delta L + \rho$
1886				*I P E*	h m s	s	s		*I P W*	h m	s		m s				
Jan 6	2489	+ 31 13	N	d	7 14 14 37	− 1 67	12 70	N	d	7 27 58 85	− 1 70	57 15	13 44 45	m s 3 44 570	− 0 0 4	− 0 118	3 44 438
	2504	+ 35 18	N	c + 1 5 b + 8	17 24 15	− 1 63	22 52	N	c − 0 4 b − 0 4	31 8 77	− 1 67	7 10	44 58				
	2517	+ 32 16	N	a − 18 1	18 56 78	− 1 67	55 11	N	a − 17 8	32 41 41	− 1 69	39 72	44 61				
	2563	+ 33 42	N	Q − 1 73 s	26 29 53	− 1 65	27 88	N	Q − 1 69 s	40 14 20	− 1 68	12 52	44 64				
	2587	+ 13 45	S		7 21 48 69	− 1 80	46 89	S		7 35 33 17	− 1 82	31 35	13 44 46	m 3 44 5 7	− 0 4	− 0 163	3 44 340
	2617	+ 27 4	S		32 51 40	− 1 7	49 69	S		46 35 93	− 1 73	34 20	44 51				
	2632	+ 20 11	S		35 20 96	− 1 76	19 2	S		49 5 56	− 1 78	3 78	44 58				
Jan 9	2381	+ 41 5	N	*I P E*	6 56 27 25	+ 1 82	29 07	N	*I P E*	7 10 13 29	− 0 0 *	13 28	13 44 21	m s 3 44 330	− 0 0 2	− 0 8	3 44 90
	2429	+ 40 53	N	d c + 1 5	7 2 35 39	+ 1 82	37 2	N	d c − 1 2	16 9 97	+ 1 67	21 64	44 43				
	2464	+ 32 1	N	b + 0 3 − 7 3	8 7 24	+ 1 77	9 01	N	b − 1 2 a − 11 8	21 51 71	+ 1 62	53 33	44 32				
				Q + 1 71 s					Q + 1 6								
	2364	+ 25 5	S		6 54 4 03	+ 1 75	5 78	S		7 7 48 74	+ 1 58	50 32	13 44 54	m 3 44 447	− 0 0 2	− 0 163	13 44 272
	2442	+ 28 2	S		7 4 59 16	+ 1 75	60 91	S		18 43 73	+ 1 60	45 33	44 42				
	2473	+ 12 15	S		9 47 46	+ 1 71	49 17	S		23 32 02	+ 1 53	33 55	44 38				
	2504	+ 35 18	N	Q − 1 71 s	7 17 27 91	− 1 65	26 26	N	Q − 1 67 s	7 31 12 24	− 1 71	10 53	13 44 27	m 13 44 263	− 0 2	− 0 118	13 44 133
	2517	+ 32 16	N		18 60 59	− 1 65	58 94	N		32 44 89	− 1 73	43 16	44 22				
	2563	+ 33 42	N		26 33 25	− 1 66	31 59	N		40 17 60	− 1 71	15 89	44 30				
	2587	+ 13 45	S		7 21 52 11	− 1 71	30 40	S		7 35 36 53	− 1 80	34 73	13 44 33	m s 13 44 333	− 0 0 2	− 0 163	13 44 158
	2617	+ 27 4	S		32 55 10	− 1 67	53 43	S		46 39 44	− 1 76	37 68	44 25				
	2632	+ 20 11	S		35 24 55	− 1 71	22 84	S		49 9 02	− 1 79	7 23	44 39				
	2639	+ 16 6	S		36 54 92	− 1 71	53 21	S		50 39 36	− 1 79	37 57	44 36				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

AMRITSAR (E) *Lat 31 38′ Lo g 4h 59m 39s* AND MOOLTAN (W) *L t 30° 11 Long 4 45 56s*

Astro m l Date	Star: B A C N mbe	Star: Decli t o	Transits Observed at E, *By B rra d with T lescope N 1*: Sta Aspect	I t m t l P t d C rre t on C t t	Mean Ob rv d T m	T t l C rrec t	S d f C rrect l T m	Transits Observed at W, *By St h with T l cop N 2*: Sta Aspect	I tru t l P t d Co re t on C t t	M an Ob rv d T e	T t l C t on	S ds f C t l T	Diff e f Corr ted T (W − E): By l Sta	Mea of Gro p	C rrect f R te f W Clock	Corrns f P rsl Eq t ns $B_E - S_E = -$, $B_S - S_S = -0\ 63$	ΔL + ρ
1886					h m					h m			m				
Jan 10	2381	+ 4 5	N	*I P W*	6 56 0 3	+ 3	3 33	N	*I P E*	7 1 3	1 (3	4 64	13 44 3	m 3 44 3 3	− 6	− 1 8	3 44 9
	2416	+ 36 58	N	d − 3 1	7 0 47 47	+ 1 7	49 8	N	d c − 1 2	4 32 0	+ 1 60	33 6	44 43				
	2429	+ 40 53	N	b + 0 7 − 2	2 36 79	+ 1 74	38 53	N*	b − 8 − 8 8	6 2 9	+ 1 63	22 82	44 29				
	2464	+ 3 1	N	Q + 7	8 8 59	65	4	N	Q + 1 67	2 53	+ 6	54 6	44 38				
	2364	+ 25 5	S		6 54 5 45	+ 59	7 4	S		7 7 49 97	+ 58	5 55	3 44 51	m 3 44 4	− 6	− 63	3 44 7
	δ G m	+ 22	S		59 4 79	+ 57	42 36	S		13 5 6	+ 57	26 73	44 37				
	2442	+ 8 2	S		7 5 6	+ 6	2 2	S		8 45 8	+ 57	46 (5	44 44				
	2473	+ 2 5	S		9 48 86	+ 50	50 3(	S		23 33 3	+ 54	34 84	44 48				
	2483	+ 3 3	N	Q − 1	7 4 9 35	− 77	7 8	N	Q − 6	7 28 3 7(	− 1 76	2 0	3 44 42	m 3 44 48	− 0 6	− 8	3 44 84
	2 04	+ 35 8	N		17 9 2	− 75	7 37	N		3 3 5)	− 73	1 86	44 49				
	2517	+ 3 (	N		19 1 87	− 1 6		N		3 46 25	− 75	44 5	44 3)				
	2 63	+ 33 4	N		26 34 6	− 75	32 86	N		40 8 98	− 75	17 23	44 37				
	2537	+ 13 45	S		7 21 53 49	− 9	5 58	S		7 35 37 93	− 8	36 12	13 44 54	m 3 44	− 6	− 0 63	3 44 3 8
	2617	+ 7 4	S		32 56 36	− 1 82	54 54	S		46 4 8	− 76	3) 02	44 48				
	2632	+ 2 1	S		35 25 88	− 1 86	24 2	S		49 3	− 78	8 52	44 5				
Jan 12	2381	+ 41 5	N	*I P W*	6 56 3 43	+ 1 75	34 8	N	*I P W*	7 10 7 0	+ 74	18 76	3 44 58	m 3 44 43	− 0 3	− 18	3 44 40
	2416	+ 36 58	N	d − 3	7 0 51 44	+ 1 73	53 7	N	d − 4	14 35 98	7	37 69	44 5				
	2429	+ 40 53	N	b + − 6 6	2 40 64	75	42 39	N	b + − 8 6	16 5 26	+ 1 74	27 00	44 6				
	2464	+ 32 1	N	Q + 1 73	8 2 56	+ 1 68	14 24	N	Q + 1 (7	21 57 00	+ 1 7	58 7	44 46				
	2364	+ 25 5	S		6 54 9 32	+ 1 63	10 95	S		7 7 53 92	+ 1 66	55 58	3 44 63	m 3 44 603	− 023	− 63	3 44 47
	δ Gem	+ 22 12	S		59 44 64	+ 1 60	46 24	S		13 29 7	+ 1 66	3 83	44 59				
	2442	+ 8 2	S		7 5 4 57	+ 1 65	6 22	S		8 49 3	+ 68	5 8	44 59				
	2473	+ 2 5	S		9 52 85	+ 1 53	54 38	S		23 37 36	+ 6	38 ,8	44 6				

* Owing to th irreg lar rate of the Chronograph th P n Equation had to be applied graphically on the record b fore th tar signals w ad off and consequently in these cases Q = 0 00.

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

AMRITSAR (E) *L t 31 38′ L g 4h 59 39s* AND MOOLTAN (W) *Lat 30° 11 L g 4h 45m 56s*

Astronomical Date	Star: B A C Number	Star: Dec l t	Transits Observed at E (*By B rr d with T l op No 1*): St Aspect	I t m tal Io t o and Corre t on C ta t	M an Ob rv d T m	T tal C rrec t	S c d f C rr t ed T m	Transits Observed at W (*By St h w th T les op No 2*): Sta Aspect	I trum tal P t n a d C rrect n C ta ts	Mean Ob rv d T me	Tot l C t n	Seco ds f C t d Time	D ffere ce of Co ected T mes (W − E): By ol Star	Mea of G o p	C rrection f Rate of W Clock	C rrns f P rsl. Equat ns $B_N - S_N = -0^s \cdot 8$, $B_S - S_S = -0 \cdot 63$	$\Delta L + \rho$
1886					h m					h m			m s				
J n 12	2489	+ 31 3	N	*I P W*	7 4 3 39	− 78	2 6	N	*I P W*	7 8 7 77	− 65	6	3 44 51	m 3 44 54	− 3	− 8	3 44 399
	2504	+ 35 18	N	d c − 3 1	17 33 20	−1 76	3 44	N	d c − 4	31 17 60	−1 63	15 97	44 53				
	2517	+ 32 16	N	b + −16 6	19 5 9	− 78	4 12	N	b + a − 8 6	32 5 29	−1 64	48 65	44 53				
	2563	+ 33 42	N	s Q − 1 73	26 38 59	−1 77	36 82	N	s Q − 1 67	4 23 05	−1 64	2 41	44 59				
	2537	+ 13 45	S		7 21 57 59	−1 9	55 68	S		7 35 41 96	− 7	4 24	3 44 56	m 3 44 6	− 3	− 63	3 44 4 4
	2617	+ 27 4	S		32 6 4	−1 82	58 59	S		46 44 95	−1 66	43 29	44 70				
	2632	+	S		35 29 99	− 87	8 2	S		49 4 39	− 69	7	44 58				
	2639	+ 16 6	S		36 60 34	−1 91	58 43	S		5 44 73	−1 70	43 03	44 6				
Jan 14	2381	+ 41 5	N	*I P E*	6 56 38 28	+1 52	39 80	N	*I P W*	7 10 22 57	+ 67	24 24	3 44 44	m 3 44 400	− 25	− 0 8	13 44 257
	2416	+ 36 58	N	d c − 3 5	7 0 57 27	+ 5	58 77	N	d c − 1 4	4 4 54	+1 65	43 9	44 42				
	2429	+ 40 53	N	b − 6 −14 2	2 46 55	+1 52	48 07	N	b − 9 − 5 3	16 30 76	+1 67	32 43	44 36				
	2464	+ 32 1	N	s Q + 1 72	8 18 31	+1 47	19 78	N	s Q + 1 71	22 2 52	+1 64	4 16	44 38				
	2364	+ 25 5	S		6 54 15 19	+1 45	16 64	S		7 7 59 42	+1 64	61 06	13 44 42	m 3 44 493	− 0 025	− 0 163	13 44 305
	δ G m	+ 22 2	S		59 50 35	+1 42	51 77	S		13 34 7	+ 63	36 33	44 56				
	2442	+ 28 2	S		7 5 10 30	+1 44	1 74	S		18 54 61	+1 64	56 25	44 51				
	2473	+ 12 15	S		9 58 6	+1 38	59 98	S		23 42 84	+1 62	44 46	44 48				
	2489	+ 31 13	N	s Q − 1 72	7 14 29 16	−1 97	27 19	N	s Q − 1 71	7 28 13 40	−1 78	11 62	13 44 43	m 13 44 460	− 0 025	− 0 1 8	13 44 317
	2504	+ 35 8	N		17 39 3	−1 94	37 09	N		31 23 3	−1 76	21 54	44 45				
	2563	+ 33 42	N		26 44 34	−1 96	42 38	N		40 28 65	−1 77	26 88	44 50				
	2537	+ 13 45	S		7 22 3 33	−2 04	1 29	S		7 35 47 51	−1 80	45 71	13 44 42	m s 13 44 490	− 0 025	− 0 163	13 44 302
	2617	+ 27 4	S		33 6 23	−1 99	4 24	S		46 50 56	−1 78	48 78	44 54				
	2632	+ 20 11	S		35 35 7	−2 02	33 69	S		49 19 99	−1 79	18 20	44 51				
	2639	+ 16 6	S		37 6 14	−2 03	4 11	S		50 50 40	−1 80	48 60	44 49				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

AMRITSAR (E) *Lat 31 38′ Long 4 59ᵐ 39ˢ* AND MOOLTAN (W) *Lat 30° 11 Long 4 45 56*

Astron mical Date	Star: B A C Number	Star: Decli nat on	Transits Observed at E, By B rrard w th T lescop No 1: St Aspe t	Transits Observed at E: In t um tal P it n and Correct on C t t	Transits Observed at E: Mean Ob ed T me	Transits Observed at E: Tot l Corr c t n	Transits Observed at E: S co ds of Co ect ed Tim	Transits Observed at W, By H ide w th T lescop No 2: Sta A pect	Transits Observed at W: I trum ntal P t d C rrect C t t	Transits Observed at W: Mean Ob rved Time	Transits Observed at W: Tot l Correc t on	Transits Observed at W: S c ds f C t d l m	Diff ren of C rrected Tim (W − E): By each Star	Diff ren of C rrected Tim (W − E): Mean of Group	Correcti n for Rate of W Clock	Corrns. f P rsl. Equat ns $B_E - H_E = - 0^s$ $B_S - H_S = - 0$ 37	$\Delta L + \rho$
1886					*h m*					*h m*		*s*	*m s*				
Jan 19	2381	+ 4 5	N	*I P E*	6 56 5 8	+1 5	51 86	N	*I P E*	7 0 34 44	+ 9	36 34	3 44 48	= 3 44 445	− 0 3	− 0 05	13 44 3 7
	2416	+ 36 58	N	*d* − 3 5	7 1 9 78	+1 3	0 8	N	*d* − 2	14 53 4	+1 86	55 8	44 47				
	2429	+ 40 53	N	b − 3 2 −27 9	2 59 0	+1 5	60 5	N°	b − 2 2 − 5	16 42 6	+1 89	44 50	44 45				
	2464	+ 32 1	N	Q +1 41	8 3 92	+ 99	3 9	N	*s* Q +1 88	22 14 47	+ 82	6 29	44 38				
	δ Gem	+ 22 2	S		7 0 3 03	+0 90	3 93	S		7 3 46 53	+1 77	48 30	13 44 37	= 3 44 4 7	− 0 3	− 0 137	3 44 47
	2442	+ 28 2	S		5 22 88	+0 95	23 83	S		19 6 47	+1 79	8 26	44 43				
	2473	+ 12 15	S		10 11 21	+ 84	12 05	S		23 54 76	+1 71	56 47	44 42				
	2489	+ 31 13	N	*s* Q − 1 41	7 14 41 3	−1 85	39 28	N	Q − 1 88	7 28 25 58	−1 94	23 64	13 44 36	= 3 44 400	− 0 3	− 0 105	3 44 27
	2504	+ 35 18	N		17 50 91	−1 82	49 09	N		31 35 44	−1 91	33 53	44 44				
	2517	+ 32 16	N		9 23 57	− 83	21 74	N		33 8 09	− 93	6 16	44 42				
	2563	+ 33 42	N		26 56 38	−1 82	54 56	N		40 40 86	−1 92	38 94	44 38				
	2617	+ 27 4	S		7 33 18 20	−1 88	16 32	S		7 47 2 62	−1 97	0 65	3 44 33	= 13 44 357	− 0 023	− 137	3 44 97
	2632	+ 20 11	S		35 47 77	−1 93	45 84	S		49 32 19	−2 00	30 19	44 35				
	2639	+ 16 6	S		37 8 13	−1 96	16 17	S		51 2 59	−2 3	0 56	44 39				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

MOOLTAN (E) *Lat* 30° 11 *Long* 4ʰ 45ᵐ 56ˢ AND KARACHI (W) *Lat* 24° 51 *Long* 4ʰ 28ᵐ 18ˢ

Astronomical Date	Star: B.A.C. Number	Star: Declination	Transits Observed at E, By Barrard with Telescope No 1: Star Aspect	Instrumental Position and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Heavaside with Telescope No 2: Star Aspect	Instrumental Position and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Personal Equations $B_N - H_N = -0\ 40$, $B_S - H_S = -0\ 29$	$\Delta L - \rho$
1886					h m s		s			h m		s	m				
Jan 27	2014	+ 35 1	N	*I P E*	6 0 20 74	+ 70	22 44	N	*I P E*	6 28 2 4	+ 2 0	4 41	17 41 97				
	2021	+ 35 15	N	d c + 0 3	11 41 27	+ 70	42 97	N	d c + 2 2	29 22 9	+ 2 03	24 94	4 97	= 7 4 985	+ 06	− 0 40	7 4 906
	2139	+ 38 32	N	b − 1 a − 4 5	29 7 7	+ 1 72	9 43	N	b + 4 7 − 32 2	46 49 34	+ 2 9	5 43	42 00				
	2156	+ 4	N	s Q + 1 71	31 17 9	+ 1 73	9 64	N	Q + 1 68	48 59 53	+ 2 1	61 64	42 00				
	2047	+ 22 34	S		6 16 28 74	+ 68	30 42	S		6 34 10 62	+ 1 82	12 44	7 42 02				
	2067	+ 2 43	S		19 17 2	+ 69	8 81	S		36 59 9	+ 1 8	6 90	42 9	= 7 4	+ 0 06	− 0 29	7 4 35
	2084	+ 2 34	S		2 34 72	+ 1 67	36 39	S		39 6 75	+ 1 8	8 55	42 16				
	2111	+ 15 59	S		25 28 85	+ 66	30 5	S		43 10 9	+ 1 74	12 65	42 14				
	2200	+ 43 41	N	Q − 1 71	6 38 59 89	− 7	58 9	N	Q − 68	6 56 41 37	− 1 16	40 2	17 42 02				
	2223	+ 41 55	N		43 0 89	− 1 69	9 20	N		7 0 52 34	− 20	5 14	4 94	= 7 4 953	+ 06	− 0 140	7 4 874
	2237	+ 34 6	N		45 45 06	− 1 72	43 34	N		3 26 56	− 37	25 9	41 85				
	2270	+ 38 3	N		51 45 27	− 69	43 58	N		9 26 86	− 1 28	25 58	42 00				
	2191	+ 17 46	S		6 36 14 35	− 1 76	12 59	S		6 53 56 20	− 1 60	54 60	17 42 01				
	2208	+ 2 49	S		39 58 40	− 75	56 65	S		57 40 22	− 1 68	38 54	41 89	= 4 000	+ 06	− 0 129	7 4 93
	2285	+ 6 4	S		54	− 76	9 4	S		7 5 9	− 6	5 9	4 5				
	2299	+ 24 22	S		55 56 28	− 1 74	54 54	S		13 38 11	− 1 52	36 59	42 05				
Jan 28	2014	+ 35 11	N	*I P W*	6 10 15 81	+ 62	17 43	N	*I P E*	6 27 57 93	+ 1 59	59 52	17 42 09				
	2021	+ 35 15	N	d c − 1 9	1 36 33	+ 62	37 95	N	d c − 2 8	29 18 44	+ 1 57	20 01	42 06	= 7 42 005	+ 0 062	− 0 140	17 4 927
	2139	+ 38 32	N	b − 0 6 a − 25 4	29 2 77	+ 64	4 41	N	b − 2 9 − 9 5	46 44 9	+ 1 58	46 49	42 08				
	2156	+ 40 0	N	s Q + 1 62	31 12 97	+ 1 66	14 63	N	Q + 1 67	48 55 20	+ 1 58	56 78	42 15				
	2047	+ 22 34	S		6 16 23 94	+ 1 49	25 43	S		6 34 5 98	+ 1 5	7 49	17 42 06				
	2067	+ 21 43	S		19 12 33	+ 1 48	13 81	S		36 54 28	+ 1 5	55 79	41 98	= 17 42 068	+ 0 062	− 0 129	17 42 001
	2084	+ 20 34	S		21 29 95	+ 1 47	31 42	S		39 12 03	+ 1 52	13 55	42 13				
	2111	+ 15 59	S		25 24 08	+ 1 42	25 50	S		43 6 10	+ 1 50	7 60	42 10				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

MOOLTAN (F) *Lat 30° 11 L g 4 4 6s* AND KARACHI (W) *L t 24° 51 Lo g 4 28m 1s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By B rd with Telescope No 1: Star Aspect	Instrumental Parameters and Corrections	Mean Observed Time	Total Correction	Sidereal Time of Culmination	Transits Observed at W, By H d with Telescope No 2: Star Aspect	Instrumental Parameters and Corrections	Mean Observed Time	Total Correction	Sidereal Time of Culmination	Difference of Computed Times (W − E): By each Star	Mean of Group	Correction for Rate of Clock	Corrections for Personal Equations $B_E - H_E = -0\ 40$, $B - H_s = -0\ 9$	$\Delta L - \rho$
1886					h m		s			h m			m s				
J 28	2200	+ 43 41	N	*I P W*	6 38 54 78	− 1	53 7	N	*I P E*	6 56 37 6	− 75	35 3	7 42 4	4 000	+ 0 06	− 40	7 4 9
	22 3	+ 4 55	N	*d* − 9	43 5 67	− 54	4 3	N	*d* − 8	7 4 86	− 1 75	46	4 98				
	2237	34 6	N	b − (	45 39 9	− (3	38 8	N	b −)	3)8	−)	2 9	4 9				
	2270	+ 38 3	N	− 5 4	5 38 54	+	38 56	N	−) 5	9 22 3)	− 6	2 63	42 0				
				Q − 1 62					Q − 67								
	2191	17 46	S		(36 9 43	− 79	7 64	S		(53 5 48	− 83	49 65	17 42 1	7 4 061	+ 6	− 0 9	4 996
	2208	+ 49	S		39 53 43	− 84	59	S		5 35 4	− 85	33 57	4 98				
	2 8	+ 6 4	S		54 4 44	−	4 4	S		7 46 54	− 7	4(37	4 3				
	90	+ 24 2	S		55 49 64	−	49 53	S		13 3 8	− 15	31 66	42 13				
Jan 29	2014	+ 35 1	N	*I P W*	6 1	+ 1 52	53	N	*I P W*	6 7 5 84	+ 52	54 36	7 41 83	4 89	+ 06	− 4	7 4 86
	2021	+ 35 15	N	*d* − 9	3 53	+ 52	33 5	N	*d* − 3 8	29 3 3)	+ 1 5	14 90	41 85				
	2139	+ 38 3	N	b + 0 7 +	8 57)3	+ 5	5) 44	N	l − 3 3 − 4 4	4(39 8	+ 5(	4 38	4)4				
	21 6	+ 4	N	Q + 55	31 8 4	+ 1 5	9 6	N	Q + 65	48 5 5	+ 1 56	5 61	4 96				
	2047	+ 2 34	S		6 6 8 9	1 52	2 44	S		6 34 0 95	+ 47	2 4	17 4 98	7 4 948	+ 0 6	− 0 9	7 4 880
	2067	+ 43	S		9 7 33	+ 5	8 85	S		3(49 32	+ 4	5 7	4 92				
	2084	+ 20 34	S		21 24 9	+ 5	26 44	S		39 (94	+ 1 44	8 38	4 94				
	2111	+ 5 59	S		25 19 04	+ 52	2 56	S		43 1 09	+ 42	2 5	4 95				
	2200	+ 43 41	N	Q − 1 55*	6 38 49 82	− 1 59	48 23	N	Q − 1 65	6 56 3 95	− 1 72	30 23	7 42 00	17 4 983	+ 0 061	− 0 140	4 904
	2223	+ 41 55	N		42 6 77	− 1 59	59 8	N		7 4 84	− 73	4	4 93				
	2237	+ 34 6	N		45 34 79	− 58	33 1	N		3 7 00	− 1 8	15	42 1				
	2270	+ 38 3	N		51 35 18	− 1 59	33 59	N		9 17 33	− 1 75	15 58	41 99				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off and consequently in these cases $Q = 0\ 00$.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

MOOLTAN (E) *L t 30° 11 Lo g 4 45ᵐ 56* AND KARACHI (W) *Lat 24° 51 Lo g 4ʰ 28ᵐ 13ˢ*

Astronomical Date	Star: B A C N mb	Star: D l t	Transits Observed at E (By B rr d w th T l scop No 1): Star Aspe t	I t t l P t nd C t C t t	Mean Ob rv l Tim	Total C rr t o	Sec d f C t ed T e	Transits Observed at W (By H vnde w th T l p No 2): Sta A pect	I st un t l Pos t d C t C t t	Mean Ob d T m	T t l C t	S co d of Corr ct d T me	Diff of C rr ctod T ies (W − E): By e ch St	Mean of Gro p	C rrect f Rat f E Cl k	C rrn f P rsl Equat $B_V - H_N = -0^s\,4\ 9$, $B - H = -0\ 9$	$\Delta L - \rho$
1886					h m s	s	s			h m s		s	m				
Ja 29	2191	+ 17 46	S	*I P W*	6 36 4 09	− 58	2 5	S	*I P W*	6 53 46 4	− 86	44 55	7 42 4	m 7 4 043	+ 6	− 29	7 4 9 5
	2208	+ 12 4)	S	d −)	39 48 06	−1 58	46 48	S	d − 3 8	57 30 40	− 88	28 52	42 4				
	2285	+ 16 4	S	b + 7 +	53 (8	−1 58	59 24	S	b − 3 3 a − 4 4	7 1 43 7	− 87	4 3	42 6				
	2299	+ 24 22	S	Q −1 55	55 46	−1 58	44 53	S	Q −1 65	3 8 40	− 84	6 56	42 3				
J n 31	2014	+ 35	N	*I P E*	6 1 43	+1 3	2 74	N	*I P W*	6 27 43 7	+ 58	44 65	7 4 9	m 4 943	+ 0 6	− 0 140	7 4 864
	2021	+ 35 15	N	d + 3	11 2 9	+1 3	23 22	N	d − 3 8	29 3 6	+1 57	5 7	4 95				
	2156	+ 40 0	N	b − 4 3 a − 6 3	30 58 57	+1 34	59 91	N	b − 2 2 a −15 4	48 40 25	+1 63	4 88	41 97				
				Q +1 40					Q +1 66								
	2047	+ 22 34	S		6 16 9 37	+1 29	10 66	S		6 33 51 14	+1 51	52 65	17 41 99	m 7 4 943	+ 0 6	− 0 29	17 4 87
	2067	+ 2 43	S		8 57 76	+1 28	59 4	S		36 39 53	+ 49	4 02	41 98				
	2084	+ 20 34	S		2 5 45	+1 28	6 73	S		38 57 3	+ 5	58 63	4 9				
	2111	+ 15 59	S		25 9 56	+1 26	1 82	S		42 51 27	+1 45	52 72	41 90				
	2200	+ 43 4	N	Q − 1 4	6 38 39 9	−1 47	38 44	N	Q −1 66	6 56 8	− 7	2 47	7 42 3	m 7 4 000	+ 0 6	− 0 140	7 4 9
	2223	+ 41 55	N		42 50 81	−1 46	49 35	N		7 0 33 5	−1 70	3 35	4 00				
	2237	+ 34 6	N		4 24 96	−1 49	23 47	N		3 7 2	−1 76	5 45	4 98				
	2270	+ 38 3	N		5 25 30	−1 50	23 80	N		9 7 53	−1 74	5 79	41 99				
	2191	+ 17 46	S		6 35 54 36	−1 52	52 81	S		6 53 36 61	−1 84	34 77	17 41 96	m 17 41 955	+ 0 06	− 0 129	17 4 887
	2208	+ 12 49	S		39 38 34	− 53	36 8	S		57 20 6	−1 86	18 74	41 93				
	2285	+ 6 14	S		53 5	− 54	49 48	S		7 11 33 31	−1 87	3 44	4 96				
	2299	+ 24 2	S		55 36 3	− 52	34 79	S		13 18 56	−1 80	16 76	41 97				

OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL — ρ

MOOLTAN (E) *Lat 30 11 L g 4 45ᵐ 56* AND KARACHI (W) *L t 24° 51 L g 4 28ᵐ 13ˢ*

Astronom cal D te	Star: B A C N mb	Star: D cl nat o	Transits Observed at E, *By B rr d w th T l op N 1*: Star A pect	I t m t l P t d C t (t t	M n Ob d T	T tal C rr t	S ds f C r t d 1	Transits Observed at W, *By St h w th Tel p N 2*: St A pe t	I tri t l P t l C rr t (t t	M a Ob ed T	T t l C r o t n	S ds f C t d T	D ff e f C e ted T m (W − E): By each Sta	M an f Gro p	Correct n f Rat f E Clock	Corrns f P rsl Eq	ΔL − ρ
1836					*h m*					*h m*	*s*		*m*				
F b 2	2014	35	N	*I P F*	6 9 5 47	+ 8	5 (5	N	*I P E*	6 7 3 4	+ 53	34 57	7 4 92	= 4 9 5	+ 64	− 137	7 4 88
	2021	+ 35 5	N	*d* − 4 7	2	+ 1 7	3 7	N	*d* − 8	28 53	+ 5	55	41 85				
	2139	+ 38 32	N	b − 3 3 − 7 7	8 38 42	+ 8	3) 6	N	b − 6 − 6	46 2	+ 53	2 65	4 5				
	2156	+ 40 0	N	Q + 38	3 48 63	+ 9	49 8	N	Q + 64	48 3 3	+ 1 5	3 8	42 00				
	2047	+ 22 34	S		6 59 3)	+ 8	6 57	S		6 33 4 98	+ 54	42 52	17 4 95	= 4 9 3	+ 064	− 0 143	7 4 894
	2067	+ 2 43	S		8 47 8	+ 7	48 97	S		3( ) 44	+ 53	3)7	4 00				
	2084	+ 34	S		5 4(	+ 7	6 63	S		38 47 5	54	48 59	4 96				
	2111	+ 15 59	S		24 59 56	+ 5	6 71	S		42 4 6	+ 53	42 69	4 98				
	2200	+ 43 4	N	Q − 1 38	6 38 9 95	− 57	28 38	N	Q − 64	6 56 1 7	− 1 75	4	7 42 4	= 4 985	+ 064	− 37	7 4 9
	2228	+ 4 55	N		42 4 9	− 1 57	39 33	N		7 0 2 9	− 75	1 7	41 84				
	2237	+ 34 6	N		45 4 9	− 1 57	3 34	N		57 3	− 75	55 38	4 04				
	2270	+ 38 3	N		5 5 (	− 58	3 68	N		8 57 45	− 1 75	55 70	42 0				
	2191	+ 17 46	S		6 35 44 32	− 1 6	42 71	S		6 53 26 53	− 1 75	24 8	42 7	= 17 42 068	+ 0 064	− 0 43	7 4 989
	2208	+ 2 49	S		39 28 38	− 61	6 7,	S		57 45	− 6	8 69	4 92				
	2285	+ 16 14	S		53 40 9	− 6	39 3	S		7 1 23 9	− 1 75	44	42 14				
	2299	+ 24 22	S		55 26 26	− 1 61	24 65	S		13 8 53	− 1 74	6 9	42 14				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

MOOLTAN (E) *L t 30° 11 Long 4ʰ 45 56* AND KARACHI (W) *Lat 24° 51 Long 4ʰ 28 13ˢ*

Astronomical Date	Star: B A C N mbo	Star: D l t	Transits Observed at E, By B rr d w th T les ope No 1: St Aspect	I trum tal P t n d Correction C n t ts	M an Ob rv d T m	T tal C rr c t on	S onds of C rrect d Tim	Transits Observed at W, By St ah n w th T l sc p N 2: St A pect	In t m tal P t n l C t C t nt	Me n Ob rv d T m	T t l C rr t o	S onds f C rr t d T me	Diff of C rrected T mes (W − E): By ach St	M a of G p	C rre t n f Rat of E Clock	C rrn f P rsl Equat ns $B_N - S_N = - 0^s 37$ $B_S - S_S = - 0\ 43$	ΔL − ρ
1856					h m	s	s			h m s		s	m				
F 9	2014	+ 35	N	*I P W*	6 9 45 31	+ 1 9	47 22	N	*I P E*	6 27 27 59	+ 1 65	29 24	7 42				
	2021	+ 35 15	N	*d* c − 1 9	11 5 88	+ 89	7 77	N	*d* c − 0 8	28 48 07	+ 64	49 71	41 94	m 7 4 985	+ 66	− 0 37	7 4 94
	2139	+ 38 32	N	b − 9 − 8	28 32 32	+ 1 89	34 21	N	b − 8 − 8 5	46 4 53	+ 1 67	6 2	4 9)				
	2156	+ 40	N	Q + 2 00	30 4 55	+ 89	44 44	N	Q + 1 67	48 4 75	+ 1 68	6 43	4)9				
	2047	+ 22 34	S		6 15 5 25	+ 1 90	55 15	S		6 33 35 64	+ 1 60	37 24	17 42 09				
	2067	+ 2 43	S		8 4 66	+ 1 90	43 56	S		36 24 02	+ 59	25 61	4 5	m 4 8	+ 66	− 0 43	7 4 00
	2084	+ 2 34	S		59 3	+ 9	6	S		38 4 69	+ 5)	43 8	4 (				
	2111	+ 5 59	S		24 53 38	+ 1 8)	55 2	S		42 35 8	+ 1 57	37 38	42 11				
	2200	+ 43 4	N	Q − 2 00	6 38 25 9	− 2	23 09	N	Q − 1 67	(56 (59	− 1 67	4 92	17 4 83				
	3	+ 4 55	N		42 36	−	33 92	N		7 0 7 49	− (4	5 85	4 93	m 7 4 9	+ 0 66	− 0 37	7 4 839
	237	34 6	N		45 2	− 2	8 2	N		2 51 64	− 7	49 93	41 9				
	22 0	+ 38 3	N		5 0 45	− 2	8 34	N		8 51 98	− 1 6	50 3	41 97				
	2191	+ 17 46	S		6 35 39 44	− 2 1	37 34	S		6 53 21 08	− 1 75	19 33	17 41 99				
	208	+ 1 4)	S		3) 3 4	− 2 2	2 29	S		57 5 3	− 9	3 34	42 05	m 7 4 48	+ 0 66	− 0 43	7 4 9
	2 85	+ 16 4	S		53 36 08	− 2 11	33 97	S		7 11 17 79	− 1 77	16 02	42 05				
	2299	+ 24 22	S		55 21 38	− 2 10	19 28	S		13 3 11	− 1 73	1 38	42 10				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MOOLTAN (E) *L t 30° 11 Lo g 4 45 56ˢ* AND KARACHI (W) *L t 24° 51 Lo g 4ʰ 28ᵐ 18*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By B rr rd with T l p N 1: Star Aspect	Instrumental Paras and Corrected Constant	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By H d with T l p No 2: Star Aspect	Instrumental Paras and Corrected Constant	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected T (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Personal Equation $B_E - H_W = -0^s 4 \ldots 29$, $B_E - H = -$	$\Delta L + \rho$
1886					h m					h m			m s				
J 27	2489	+ 3 13	N	*I P E*	0 2 88	+ 68	25 56	N	*I P E*	7 8 4	1 59	5 (9	17 42 3	m 7 4 8	− 6	− 0 140	7 4 0
	2504	+ 35 8	N	d c + 0 3	3 3 68	+ 1 7	33 39	N	d − 2 8	3 3 91	+ 67	5 58	42 9				
	2517	+ 32 6	N	b − − 7 9	15 4 25	+ 1 69	5 94	N	b − 2 8 −34 6	32 46 58	+ 1 6	48 9	42 5				
	2563	+ 33 4	N	Q + 1 70	22 37	+ 70	38 80	N	Q + 64	40 9 2)	+ 65	94	4 14				
	2473	+ 12 5	S		7 5 54 63	+ (3	5((	S		7 23 37 6	+ 32	38 48	7 4 22	m 4 3	− 6	− 29	4 068
	2537	+ 3 45	S		7 55 88	+ 63	57 5	S		35 38 44	+ 35	39 79	4 8				
	2618	+ 37	S		8 4 43	+ 65	44 8	S		46 4 8	+ 4	6 (	4 8				
	2682	+ 20 1	S		3 8 37	+ 66	30 3	S		49 7	+ 1 43	2 20	42 7				
	2691	+ 41 35	N	Q − 70	7 4 47 3	− 67	4 63	N	Q − 64	7 59 9	− 46	7 76	7 42 3	m 4 8	− 6	− 0 4	4 044
	2715	+ 42 4(	N		44 4 55	− ((	89	N		8 46 56	− 45	45 1	42 2				
	2784	+ 3 49	N		46 6 98	− 69	5) 2)	N		4 43	− 1 (6	4 54	42 25				
	2747	3	N		48 36 6	− 7	14 35	N		6 18 2(	− 7	6 55	4 2				
	2676	+ 22 23	S		7 39 37 7(	− 75	36	S		7 57 20 5	− 8	8 24	17 4 3	m 4 4	− 6	− 0 9	4 095
	2761	+ 13 3	S		5 3 8	− 77	3 4	S		8 8 4	− 95	12 26	42 22				
	2778	+ 9 32	S		52 51 06	− 78	49 28	S		33 47	− 98	3 49	42 2				
	2786	+ 27 35	S		55 39 37	− 73	37 64	S		13 2 68	− 1 74	) 94	42 3				
J n 28	2489	+ 31 13	N	*I P W*	7 0 23 5	+ 1 57	24 72	N	*I P E*	7 28 5 36	+ 1 56	6 92	17 42 20	m 7 4 85	− 0 5	− 0 40	7 4 0
	2504	+ 35 8	N	d − 1 9	13 32 94	+ 6	34 36	N	d c − 2 8	31 15 29	+ 57	6 86	42 3				
	2517	+ 32 16	N	b − 6 −30 1	5 5 6	+ 1 58	7	N	b − 2 9 − 9 5	32 48 00	+ 56	49 56	42 36				
	2563	+ 33 42	N	s Q + 1 62	22 38 39	+ 1 60	39 99	N	s Q + 1 66	40 20 70	+ 1 57	22 27	42 28				
	2473	+ 12 15	S		7 5 56 27	+ 36	57 63	S		7 23 38 3	+ 1 47	39 79	17 42 16	m 7 42 245	− 0 015	− 0 129	7 4 1
	2537	+ 13 45	S		17 57 40	+ 1 38	58 78	S		35 39 62	+ 1 47	41 09	42 31				
	2618	+ 22 37	S		28 43 87	+ 1 46	45 33	S		46 26 07	+ 1 50	27 57	42 24				
	2682	+ 20 11	S		31 29 80	+ 1 45	31 25	S		49 12 01	+ 1 51	3 52	42 27				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

MOOLTAN (E) Lat 30° 11 Long 4h 45 56 AND KARACHI (W) Lat 24° 51 Long 4 28m 18

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 2): Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrections for Personal Equation $B_E - H_N = -0^s 140$, $B_S - H_S = -0 129$	$\Delta L + \rho$
1886					h m s		s			h m s		s	m s				
Jan 28	2691	+ 43 35	N	I P W	7 4 48 31	−1 49	46 82	N	I P E	7 59 3 ·66	− 69	28 9	7 42 15				
	2715	+ 42 46	N	d c − 1 9	44 5 64	−1 5	4 14	N	d c − 2 8	8 1 48 03	−1 70	46 33	42 9	m 7 4 83	− 5	− 140	7 4 028
	2734	+ 32 49	N	b − 0 6 −30 1	47 2 23	−1 65	0 58	N	b − 2 9 a − 9 5	4 44 46	−1 75	42 71	42 3				
	2747	+ 3 0	N	s Q − 1 62	48 37 28	−1 69	35 59	N	Q − 1 66	6 19 6	−1 77	17 85	42 6				
	2676	+ 22 23	S		7 39 39 5	−1 78	37 27	S		7 57 2 26	−1 8	9 45	7 42 18				
	2761	+ 13 23	S		5 33 18	−1 87	3 31	S		8 8 5 39	− 85	13 54	4 3	m 7 4 3	− 0 15	− 0 129	7 42 059
	2778	+ 9 32	S		52 52 46	−1 92	50 54	S		10 34 58	− 87	32 71	42 7				
	2786	+ 27 35	S		55 40 66	−1 73	38 93	S		13 22 95	−1 79	21 16	42 23				
Jan 29	2489	+ 31 13	N	I P W	7 10 24 54	+1 52	26 06	N	I P W	7 28 6 68	+1 54	8 22	17 42 6				
	2504	+ 35 18	N	d c − 1 9	13 34 36	+1 51	35 87	N	d c − 3 8	31 16 49	+1 57	18 06	42 19	m 7 4 55	− 0 015	− 0 140	17 42 000
	2517	+ 32 6	N	b + 7 − 3 9	15 7 00	+1 52	8 52	N	b − 3 3 a −18 9	32 49 14	+1 54	50 68	42 16				
	2563	+ 33 42	N	Q + 1 53	22 39 81	+ 52	4 33	N	s Q + 1 66	40 21 90	+1 54	23 44	42 11				
	2473	+ 12 15	S		7 5 57 35	+1 49	58 84	S		7 23 39 55	+1 40	40 95	17 42 11				
	2537	+ 3 45	S		17 58 60	+1 48	6 8	S		35 40 8	+1 4	42 21	42 13	m 17 42 8	− 0 0 5	− 0 129	17 41 984
	2618	+ 22 37	S		28 45 15	+1 48	46 63	S		46 27 28	+1 46	28 74	42 11				
	2632	+ 20 11	S		31 31 02	+1 48	32 50	S		49 13 22	+1 44	14 66	42 16				
	2691	+ 43 35	N	s Q − 1 53	7 41 49 65	−1 55	48 10	N	s Q − 1 66	7 59 31 90	−1 69	30 21	17 42 11				
	2715	+ 42 46	N		44 7 02	−1 55	5 47	N		8 1 49 24	−1 69	47 55	42 08	m s 17 42 083	− 0 015	− 0 140	17 41 928
	2734	+ 32 49	N		47 3 44	−1 54	1 90	N		4 45 73	−1 79	43 94	42 04				
	2747	+ 30 0	N		48 38 48	−1 57	36 91	N		6 20 80	−1 79	19 01	42 10				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

MOOLTAN (E) *Lat 30° 11 Long 4 45 56* AND KARACHI (W) *Lat 24° 51 Long 4 28m 13s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Barrard with Telescope No 1): Star Aspect	Instrumental Points and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 2): Star Aspect	Instrumental Points and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Diff of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Personal Equations $B_N - H_N = -0.4$, $B_S - H_S = -0.9$	$\Delta L + \rho$
1886					h m	s				h m	s		m				
Jan 29	2676	+ 2 23	S	*I P W*	7 39 4 13	−1 58	38 55	S	*I P W*	7 57 22 57	−1 86	20 71	17 42 6	7 4 0	− 5	− 0 129	7 4 966
	2761	+ 13 23	S	d; c − 1 9	50 34 21	−1 5)	3 62	S	d; − 3 8	8 8 16 65	−1 91	14 74	42 12				
	2778	+ 9 32	S	b + 7; a − 3 9	52 53 47	− 57	5 9	S	b − 3 3; −18 9	10 35 83	− 93	33 90	42 00				
	2786	+ 7 35	S	Q − 1 53	55 41 82	− 57	4 5	S	Q − 1 66	13 24 23	−1 82	22 41	42 16				
Jan 31	2483	+ 31 3	N	*I P E*	7 0 25 6	+ 29	26 9	N	*I P W*	7 8 7 49	+1 54	9 03	7 42 13	7 4 45	+ 0 007	− 0 140	7 4 0
	2504	+ 35 8	N	d; c + 0 3	3 35 38	+ 3	36 69	N	d; c − 3 8	31 17 32	+1 57	18 89	42 20				
	2517	+ 32 6	N	b − 4 3; a − 6 1	15 8 08	+ 29	9 37	N	b − 2 2; a −14 9	32 49 94	+1 56	5 50	42 13				
	2563	+ 33 42	N	s; Q + 1 40	22 40 88	+1 33	42 21	N	Q + 1 65	40 22 78	+1 55	24 33	42 12				
	2473	+ 12 15	S		7 5 58 5	+1 26	59 76	S		7 23 40 35	+1 43	4 78	17 42 02	7 4 060	+ 007	− 0 29	7 4 938
	2537	+ 13 45	S		7 59 71	+1 27	60 98	S		35 4 64	+ 45	43 09	42 11				
	2613	+ 22 37	S		28 46 2	+1 29	47 5	S		46 28 1	+ 49	29 60	4 0				
	2632	+ 20 11	S		31 32 18	+1 29	33 47	S		49 14 01	+1 47	15 48	42 01				
	2691	+ 43 35	N	s; Q − 1 40	7 41 50 24	−1 47	48 77	N	Q − 1 65	7 59 32 69	−1 69	31 00	17 42 23	17 42 88	+ 0 007	− 0 140	7 4 55
	2715	+ 42 46	N		44 7 61	−1 48	6 13	N		8 1 50 00	−1 70	48 30	42 17				
	2734	+ 32 49	N		47 4 06	−1 52	2 54	N		4 46 49	−1 77	44 72	42 18				
	2747	+ 30−0	N		48 39 14	−1 52	37 62	N		6 21 56	−1 77	19 79	42 7				
	2676	+ 22 23	S		7 39 40 89	−1 53	39 36	S		7 57 23 26	−1 80	21 46	17 42 10	17 42 153	+ 0 007	− 0 129	17 42 03
	2761	+ 13 23	S		50 34 88	−1 53	33 35	S		8 8 17 40	−1 86	15 54	42 19				
	2778	+ 9 32	S		52 54 16	−1 55	52 61	S		10 36 59	−1 86	34 73	42 12				
	2786	+ 27 35	S		55 42 47	−1 51	40 96	S		13 24 94	−1 78	23 16	42 20				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

MOOLTAN (E) Lat 80° 11 Long 4h 45 56 AND KARACHI (W) Lat 24° 51 Long 4h 28m 18s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star Aspect	Instrumental Position and Correction Constant	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Strahan with Telescope No 2: Star Aspect	Instrumental Position and Correction Constant	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Correction for Personal Equations $B_W - S_W = -0^s 37$, $B_S - S_S = -0 43$	$\Delta L + \rho$
1886					h m s		s			h m			m				
Feb 2	2489	+ 3 13	N	I P E	7 10 24 57	+1 8	5 75	N	I P E	7 28 6 39	+ 54	7 93	7 42 8	= 7 4 43	+ 0 009	− 37	7 42 5
	2504	+ 35 8	N	d − 4 7	13 34 39	+1 9	35 58	N	d − 2 8	31 16 6	+ 53	17 69	42 1				
	2517	+ 32 (	N	b − 3 3 a −10 8	5 7 3	+ 7	8 20	N	b − 6 − 0 4	32 48 84	+ 54	50 38	42 18				
	2563	+ 33 42	N	Q + 1 38	22 39 87	+1 17	41 04	N	Q + s 65	40 21 60	+ 54	23 4	42				
	2473	+ 12 15	S		7 5 57 37	+1 13	58 5	S		7 23 39 21	+1 54	4 75	7 42 25	= 7 4 2 8	+ 009	− 43	7 4 084
	2537	+ 13 45	S		17 58 66	+1 12	59 78	S		35 4 45	+1 54	4 99	42 2				
	2613	+ 22 37	S		28 45 11	+ 1(	46 27	S		46 6 91	+1 55	8 46	42 9				
	2632	+ 20 1	S		31 31 05	+1 14	32 19	S		49 12 87	+ 54	14 41	42 22				
	2691	+ 43 35	N	Q − 1 38	7 41 49 22	−1 54	47 68	N	Q − 1 65	7 59 3 66	−1 77	29 89	7 42 21	= 17 4 2 3	+ 009	− 0 137	7 42 45
	2715	+ 4 46	N		44 6 52	− 55	4 97	N		8 1 49 5	−1 78	47 27	42 30				
	2734	32 4)	N		47 2 99	−1 60	1 39	N		4 45 41	−1 76	43 65	42 26				
	2747	+ 30 0	N		48 38 01	−1 58	36 43	N		6 20 5	−1 76	18 75	42 32				
	2676	+ 22 23	S		7 39 39 78	−1 60	38 18	S		7 57 22 17	−1 77	20 40	17 42 22	= 17 42 3 8	+ 0 009	− 0 143	17 42 84
	2761	+ 13 23	S		50 33 75	− 63	32 12	S		8 8 16 26	− 76	4 50	42 38				
	2778	+ 9 32	S		52 52 99	−1 66	51 33	S		10 35 46	−1 76	33 70	42 37				
	2786	+ 27 35	S		55 41 41	−1 60	39 81	S		13 23 87	−1 76	22 11	42 30				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MOOLTAN (E) *Lat 30° 11 Long 4 45 56* AND KARACHI (W) *Lat 24° 51 Long 4 28 13*

Astronomical Date	Star: B A C Number	Star: Decl at	Transits Observed at E, By B d th T l p N 1: Star Aspect	Instrument and Clamp Correction	Mean Observed T	Total Correction	Sid ... f C t I T	Transits Observed at W, By Strat th T l cop N 2: Star Aspect	Instrument and Clamp Correction	Mean Observed T	Total Correction	Sid ... f C t I T	Diff of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Personal Equation $B_W - S_W = -0^s.37$, $B_E - S_E = -0.43$	$\Delta L + \rho$
1886					*h m*					*h m*							
F b 3	2489	3 3	N	*I P W*	7 0 89	+ 9	4 9	N	*I P E*	7 8 5 4	+ (4	7 (	7 4	4 3	+ 0	− 0 37	17 4 09
	2 04	+ 35 8	N	*d* −)	3 32 8	+ 9	34 (9	N	*l* − 8	3	6	6 89	42				
	517	3 (	N	1 −) − 3 4	5 5 46	+ 9	3(	N	1 − 8 − 8 8	3 47 9	+ 65	49 55	4)				
	2563	+ 33 4	N	Q + 00	2 38	+ 9	4	N	Q ()	4 6	+ (5	22 3	42 28				
	24 3	+	S		7 5 55 8	+ 88	57 ((	S		7 3 38 3	59	39 8)	7 42 23	4	+	− 43	4 43
	2 37	+ 3 45	S		7 56)8	88	8 8(	S		35 3) 58	5)	4 7	4 3				
	613	+ 3	S		8 43 54	9	45 44	S		4(((	+ (	(8	4 4				
	63		S		3 9 4	+ 88	3 3	S		49	+ 1 6	3 6	4 3				
	691	+ 43 35	N	Q −	4 49 00	− 9	4( )	N	Q − 6)	7 59 3 68	− (8	9	7 42)	4 63	+	− 0 37	7 4 037
	2 1	4 4(	N		44 6 3	− 09	4 3	N		8 48 3	− ()	4(34	4				
	2 34	3 4)	N		47 (5	−	55	N		4 44 5	− 3	4)	4 4				
	2"47	+ 30	N		48 37 7	−	35 6	N		6 9 55	− 73	7'8	42 2				
		−															
	2 76	+ 22 3	S		7 39 39 4	− 2	37 3	S		57 2 3	− 76	9 54	7 4 3	4 5	+ 00	− 43	7 4 3
	2761	+ 3 23	S		5 33 36	− 2 2	3 24	S		8 8 5 37	− 79	3 58	42 34				
	2778	+ 9 3	S		5 5 68	− 2	5 5(	S		34 5	− 8	3 75	4 9				
	2"86	+ 27 35	S		55 4 04	− 2 12	38 92	S		3 22 93	− 1 75	21 8	42 26				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

PESHAWAR (E) *L t 34° 0′ Long 4ʰ 46ᵐ 22ˢ* AND MOOLTAN (W) *Lat 30° 11 Long 4 45 56ˢ*

Astronomical Date	Star: B A C Nu b	Star: D l t	Transits Observed at E, *By B d w th Tel scope No 1*: Sta A pe t	I t t l I t nd C ti n Co t t	M an Obs rv d Time	Tot l Cor c tio	S d of C rre t d T o	Transits Observed at W, *By Str h w th T le p N 2*: St A pe t	I t tal I t d C rr t C ta t	M n Ob d T me	T t l C ec t	S ond f C t d T m	D ff of C re t d Times (W − E): By h St	M of G up	C rre t n fo R t f E Cl k	C rrns f P rsl Equat ns $B_N - S_N = -0\ 155$, $B_S - S_S = -0\ 53$	$\Delta L - \rho$
1880				*I P E*	h m s	s	s		*I P E*	h m s	s		m s				
Feb 9	2638	+ 44 17	N	d	7 5 31 08	+ 2 33	33 41	N	d	7 5 59 1	+ 1 73	60 83	27 42	m 0 7 457	+ 00	− 0 5	0 27 3
	2601	+ 43 35	N	c + 8 3, b + 4 2	59 30 87	+ 2 35	33 22	N	c + 1 4, b + 3	59 58 96	+ 1 73	6 (9	27 47				
	2715	+ 42 46	N	a + 27 1	8 1 48 16	+ 2 37	50 53	N	a − 0 2	8 2 16 28	+ 73	18	27 48				
				Q + 2 20					Q + 1 65								
	2617	+ 27 4	S		7 46 45 2	+ 2 52	48 24	S		7 47 4 4	+ 1 73	5 77	0 7 53	m 500	+ 00	− 53	348
	649	+ 6 5	S		5 5 (	+ 2 6	8 36	S		52 44 3	+ 1 7	45 8	27 49				
	2659	+ 7 37	S		54 29 88	+ 2 59	32 47	S		54 58	+ 7	59 94	27 47				
	26/2	+ 28 7	S		56 45 5	+ 2 52	48 09	S		57 3 88	+ 1 72	15 (0	27 51				
	2793	+ 43 33	N	Q − 2 20	8 15 20 99	− 2 06	18 93	N	Q − 1 65	8 15 48 05	− 1 57	46 48	0 / 55	7 49	+ 0 0	− 0 155	0 7 336
	27)8	+ 42 22	N		17 18 79	− 2 02	16 /7	N		17 45 85	− 1 57	44 28	27 51				
	2855	+ 38 25	N		25 49 5	− 1 99	47 52	N		26 6 5	− 58	4 93	27 4				
	2759	+ 18	S		8 7 58 39	− 1 81	56 58	S		8 8 25 0	− 1 58	24 12	0 27 54	m 2 6 5	+ 00	− 0 53	0 27 4 3
	2778	+ 9 32	S		10 38 58	− 1 74	36 84	S		11 6 15	− 1 58	4 57	27 73				
	2815	+ 28 6	S		9 50 6	− 1 88	48 7	S		20 7 9	− 58	6 32	27 60				
	2833	+ 24 3	S		22 10 5	− 1 86	8 19	S		22 37 4	− 1 58	35 82	27 63				
Feb 10	2 68	+ 33 42	N	*I P W*	7 40 22 6	+ 2 18	24 79	N	*I P E*	7 40 50 65	+ 1	52 37	0 27 58	m 0 2 85	0 000	− 0 55	0 7 430
	638	+ 44 1	N	l, −)	5 29 5(	+ 2 5	3 6	N	d, + 4	5 57 48	+ 74	59 22	27 6				
	2601	+ 43 35	N	b + 8, + 17 7	59 9 4	+ 2 6	3 5	N	b +, − 2 6	59 57 34	+ 1 74	59 08	27 5				
	2715	+ 42 46	N	Q + 2 19	8 1 46 7	+ 2 07	48 84	N	Q + 1 65	8 2 14 68	+ 1 74	16 42	27 58				
	2617	+ 27 4	S		7 46 44 37	+ 2 21	46 58	S		7 47 12 42	+ 1 72	14 14	0 27 56	m 0 27 660	0 000	− 0 153	0 27 507
	2640	+ 16 5	S		52 14 25	+ 2 29	16 54	S		52 42 5	+ 1 71	44 21	27 67				
	2659	+ 17 37	S		54 28 29	+ 2 28	30 57	S		54 56 55	+ 1 71	58 26	27 69				
	26 2	+ 28 7	S		56 44 07	+ 2 20	46 27	S		57 12 27	+ 1 72	13 99	27 72				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

PESHAWAR (E) *L t 34° 0′ L g 4h 46m 22s* AND MOOITAN (W) *Lat 30° 11 Long 4 45 56s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burra d with Telescope No 1): Star's Aspect	Instrumental Errors, Polo to d Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Strah with Telescope No 2): Star's Aspect	Instrumental Errors, Pt and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Time (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Personal Equation $B_N - S_N = -0^s.55$, $B_S - S_S = -0.153$	$\Delta L - \rho$
1886					h m		s			h m s	s		m s				
F b 10	2793	+ 43 33	N	*I P W*	8 5 9 73	−2 32	7 4	N	*I P E*	8 54(34	−1 56	44 78	0 27 37	0 5 0	000	− 0 55	0 365
	2798	+ 42 2	N	d − 9	7 7 43	−2 3	5 12	N	d + 1 4	7 44	−1 56	42 64	27 52				
	2855	+ 38 5	N	b + 8 +17 7	25 48 00	− 25	45 75	N	b 1 − 2 6	26 15 0	− 58	3 42	27 67				
				Q − 2 19					Q − 1 6								
	2759	+ 8	S		8 7 56 88	−2	54 78	S		8 8 24 05	−1 60	22 45	0 27 67	0 594	0 000	− 0 153	0 27 441
	2778	+ 9 3	S		37	− 04	35 8	S		11 4 4	− 6	2 79	27 6				
	2786	+ 7 35	S		3 25 8	− 8	3 64	S		35 8	− 58	5 2	7 58				
	2815	+ 28 (	S		9 49 2	−2 8	47 3	S		20 6)	−1 59	4 60	27 57				
	2833	+ 24 3	S		22 8 66	−2 5	6 5	S		2 35 64	−1 59	34 05	27 54				
Feb 11	2638	+ 44 7	N	*I P W*	7 5 8 3	+ 2	3 34	N	*I P W*	7 5 56	+1 9	57 92	0 27 58	0 760	000	− 0 155	0 7 575
	691	+ 43 3	N	d − 9 b + 7 a − 6 7	59 7 85	+2 2	3 6	N	d + 4 b + 9 − 6 6	59 55 9	+ 9	57 8	27 6				
				Q + 2 5					Q + 1 66								
	2617	+ 7 4	S		7 46 43 3	+ 5	45 18	S		7 47 0 9)	+1 83	12 82	0 27 64	0 3	0 000	− 0 53	0 2 570
	2649	+ 16 5	S		52 13 2	+ 3	5 5	S		52 4 13	+1 79	4 9	27 77				
	2659	+ 7 3	S		54 7 2	+2 3	29 25	S		54 55 8	+1 79	56 97	27 72				
	2672	+ 28 7	S		56 42 8	+2 15	44 93	S		57 10 83	+1 86	2 69	27 76				
	2793	+ 43 33	N	Q − 2 5	8 5 18 1	−2 09	16 2	N	Q − 1 66	8 15 44 99	− 4	43 58	0 27 5(	590	0 000	− 0 155	0 27 435
	2798	+ 4	N		17 5 84	−2 0	13 74	N		17 4 76	−1 4	41 35	27 6				
	2855	+ 38 35	N		25 46 5	−2 1	44 4	N		26 3 43	− 42	2	27 6				
	2759	+ 18 1	S		8 7 55 72	−2 18	53 54	S		8 8 22 66	−1 54	21 12	0 27 58	0 27 674	0 00	− 0 153	0 5
	2778	+ 9 32	S		0 36 2	−2 20	33 92	S		11 3 09	− 55	1 54	27 62				
	2786	+ 27 35	S		13 24 41	−2 16	22 25	S		13 51 43	−1 49	49 94	27 69				
	2815	+ 28 6	S		19 47 82	−2 15	45 67	S		20 14 91	−1 50	13 41	27 74				
	2833	+ 24 31	S		22 7 32	−2 17	5 15	S		22 34 42	−1 53	32 89	27 74				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

I ESHAWAR (E) L t 34 0' L g 4 46 27 AND MOOLTAN (W) Lat 30° 11 L g 4 40 56

Astronomical Date	STAR B A C N b	STAR D l n t	TRANSITS OBSERVED AT E By B l with T l p N 1: Aspect	I t l t l C t C t t	M Ob d I	T t l C t	S d f (t t l	TRANSITS OBSERVED AT W By St h th T l p N 2: Aspect	I t l t l d C rr t C t t	M Ol l I	T t l C t	S l t C t d F o	Diff f C t d F (W − E): By St	M f G p	C ect f R te f E Cl k	C f P rsl Eq t n $B_N - S_N = -0.5$ $B_S - S_S = -0.53$	$\Delta L - \rho$
1886					h m					h m		s					
F b 12	2638	+ 44 7	N	I P E	7 5 7 4(	+2 29	9 75	N	I P W	7 5 5 53	+ 5	57 8	7 53	48	8	55	7 5
	2691	+ 43 35	N	d + 3	59 2 8	+2)	) 57	N	l +	59 55 3	4	57 4	2 4				
	2715	+ 42 4(	N	b + 4 8 + 3	8 44 6	+ 3	46)	N	b + − 5	8 6	+ 73	4 35	7 44	m		1	
				Q + 6					Q + 6								
	2617	+ 27 4	S		7 46 4 38	+ 29	44 67	S		7 47 1 5	+ (4	4	47	4 3	8	53	3
	2640	+ 6 5	S		5 38		4 68	S		52 4 55	+1 5	4 5	7 47				
	2659	+ 7 3	S		54 (44	3	8 75	S		54 54 6(	+ 59	56 5	2 5			1	o
	2672	+ 28 7	S		56 4	+2 3	44 43	S		57 24	+ 64	88	45				
	2703	+ 43 3	N	Q − 2 6	8 5 33	−2 4	5 9	N	Q − 6	8 44 4	− 5	4 9	7 (	8		55	43
	2708	+ 42	N		17 5 21	−2	3 2	N		17 42 2	− 5	4 6	5(				
	2855	+ 38 5	N		25 45 84	− 4	43 8	N		6)	− 54	38	27 58	m		1	o
	2750	+ 18	S		8 7 55 2	−2 0	53 0	S		8 8 2 2	− 6	55	o 27 54				
	2758	+ 9 32	S		35 4	− 03	33 37	S		58	−1 ( )	89	27 5	6	8	53	4 3
	2780	+ 27 35	S		3 3 5	− 3		S		3 5 9(	− (	4) 3(	7 (4				
	2815	+ 28 6	S		19 4 6	−	45 15	S		4 35	− (		7 6	m		1	
	2833	+ 24 3	S		22 6 64	− 3	4 61	S		2 33 82	− 63	32 9	27 8				
F b 1	2 63	+ 33 4	N	I P I	4 ((8	+ 29	8 9	N	I P F	7 40 44 6	+ 7	46 38	27 41	300	000	55	7 35
	2638	+ 44	N	l + 3	5 23 72	8	25 9	N	d + 4	5 5 5	2	53	7 3				
	2691	+ 43 35	N	b + 3 2 + 7 9	59 3 54	+2 9	25 73	N	b + 4	59 51 47	+	53 8	7 4	m o		1	
	2 15	+ 42 46	N	Q + 2	8 1 40 9	+2 20	43 1	N	2 Q + 2 6	8 2 8 9	+1 71	0 50	27 39				
	2617	+ 27 4	S		7 46 38 39	+2 31	40 0	S		7 47 6 4	+ 72	8 8	o 27 48	2 5 3	0 000	o 153	7 360
	2649	+ 6 5	S		52 8 37	+ 3	10 4	S		52 36 54	+2	38 24	27 50				
	2659	+ 7 3	S		54 2 49	7	4 96	S		54 5 64	+	5 34	2 48	m		− 1	o
	2672	+ 28 7	S		56 38 5	+2 3	4 46	S		57 6 34	+ 7	8 5	27 59				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

PESHAWAR (E) *Lat* 34° 0′ *Long* 4 46ᵐ 22ˢ AND MOOLTAN (W) *Lat* 30° 11 *Long* 4ʰ 45ᵐ 56ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By B rrard with Telescope No 1): Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Strah with Telescope No 2): Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Diff of Corrected Times (W − E): By each Star	Mean of Group	Correct for Rate of E Clock	Corrns for Personal Equations $B_N - S_N = -0^s\ 55$, $B_S - S_S = -0\ 53$	$\Delta L - \rho$
1886					h m s					h m s			m				
Feb 17	°793	+ 43 33	N	*I P E*	8 5 3 6	− 2 3	48	N	*I P E*	8 54 48	− 1 51	38 97	0 27 49	483	000	55	328
	2798	+ 42 22	N	d c + 3	7 1 47	− 2 12	9 35	N	d + 4	17 38 3	− 1 5	36 8	27 46			0	
	2855	+ 38 5	N	b + 3 2 + 7 9	25 42 03	− 9	39 94	N	b + 2 + 0 4	6 8 95	− 5	7 44	27 5	s		−	0
				Q − 2 5					Q − 6								
	2759	+ 8	S		8 7 50 97	− 95	49	S		8 8 18 09	− 1 53	16 56	27 54				
	2778	+ 9 32	S		10 31 4	− 90	29 5	S		0 58 49	− 53	56 96	27 45	7 5 4	0 000	153	27 36
	2786	+ 27 35	S		13 9 84	− 2 01	17 83	S		13 46 88	− 5	45 37	27 54				
	2815	+ 28 6	S		19 43 7	− 2	4 6	S		1 35	− 5	8 84	27 58	s 0		−	
	2833	+ 24 3	S		2 2 77	− 1 99	0 78	S		22 29 76	− 1 52	28 24	27 46				
Feb 18	2563	33 4	N	*I P W*	7 40 15 36	+ 3	7 68	N	*I P E*	7 4 43	+ 56	45 6	0 27 58				
	2638	+ 44 7	N	d + 3	5 2	+ 2 43	24 54	N	d − 6	5 5 66	+ 54	52 2	27 ((	7 6 8	000		4 3
	2691	+ 43 35	N	b + 3 a −	59 2 9	+ 2 4	24 33	N	b − 7 + 3	59 5 46	+ 54	52	27 67	s 0		−	0
	2715	+ 42 46	N	Q + 2 18	8 39 8	+ 4	4 69	N	Q + 1 60	8 2 7 5	+ 1 54	9 9	27 6				
	2617	+ 27 4	S		7 46 37	+ 2 3	39 51	S		7 47 5 47	+ 1 5(	7 3	0 27 5				
	2649	+ 6 50	S		52 7 24	+ 2 26	9 50	S		52 35 44	+ 1 6	37 4	27 54	27 35	0 000	0 53	27 382
	2659	+ 7 37	S		54 2 3	2 25	23 56	S		54 49 53	+ 59	5	7 56	s		−	
	2672	+ 28 7	S		56 36 97	+ 32	39 29	S		57 5 25	1 56	6 8	7 52				
	2793	+ 43 33	N	Q − 2ˢ 18	8 15 12 8	− 1 94	0 24	N	Q − 1 60	8 5 39 35	− 66	37 69	0 27 45	60	000	55	7 4 5
	2798	+ 42 22	N		7 9 90	− 1 97	7 93	N		17 37 2	− 66	35 56	27 63			0	
	2855	+ 38 25	N		25 40 60	− 1 99	38 6	N		26 7 86	− 65	6 21	27 6	s 0		−	
	2759	+ 18	S		8 7 49 83	− 2 11	47 72	S		8 8 16 98	− 1 62	15 36	0 27 64				
	2778	+ 9 32	S		10 30 27	− 2 14	28 13	S		10 57 30	− 1 60	55 70	27 57	s 27 634	0 000	0 53	27 48
	2786	+ 27 35	S		13 18 53	− 2 05	16 48	S		13 45 76	− 1 64	44 12	27 64				
	2815	+ 28 16	S		19 42 01	− 2 04	39 97	S		20 9 25	− 64	7 6	27 64	s 0		−	
	2833	+ 24 31	S		21 61 43	− 2 06	59 37	S		22 28 67	− 6	27 05	27 68				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

PESHAWAR (E) Lat 34° 0′ Long 4 46m 22s AND MOOLTAN (W) Lat 30° 11 Long 4h 45 56s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By B rrard with Telescope No 1: Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By St h n with Telescope No 2: Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Personal Equations $B_W - S_E = -0\ 55$, $B - S_8 = -0\ 53$	$\Delta L + \rho$
1886					h					h m			m				
Feb 9	2989	+ 44 9	N	I P E	8 43 45 64	+2 34	47 98	N	I P E	8 44 4 3	+ 73	5 76	27 78	7 787	000	− 0 55	2 632
	3027	+ 40 38	N	d + 5 3	48 34 37	+2 36	36 73	N	d c + 1 4	49 2 8	+1 3	4 53	27 80				
	3060	+ 38 3	N	b + 4 2 +30	52 43 74	+2 41	46 5	N	b + 1 3 a − 0 2	53 2 21	+ 7	13 93	27 8				
				Q + 2 20					Q + s 65								
	2937	+ 21 52	S		8 36 8 98	+2 58	56	S		8 36 37 52	+1 2	39 24	0 27 68	6	000	− 0 153	0 7 5 7
	2958	+ 10 3	S		38 1 36	+ 68	4 04	S		38 3 0	+ 7	3 73	27 69				
	2971	+ 6 5	S		4)	+2 70	4 61	S		4 40 53	+ 7	42 4	7 63				
	2978	+ 6 6	S		4 5 4	+2 7	53 95	S		42 9 92	+1 7	21 63	27 68				
	3013	+ 5 46	S		45 50 49	+2 7	53 20	S		46 9 16	+ 7	2 87	27 67				
	3100	+ 38 44	N	Q − 2 20	8 59 6 40	−2 00	4 40	N	Q − 1 s 65	8 59 33 73	− 58	32 5	0 27 75	7 698	000	− 0 55	27 543
	3131	+ 43 4	N		9 5 53 07	−2 06	5 0	N		9 6 2 35	− 57	8 78	27 77				
	3144	+ 35 6	N		7 46 59	−1 94	44 65	N		8 3 86	− 58	1 28	27 63				
	3162	+ 37 17	N		1 7 12	− 98	15 4	N		1 44 42	−1 58	4 84	7 70				
	31 8	+ 34 52	N		13 38 75	−1 94	36 81	N		14 6 03	−1 58	4 45	27 64				
	3111	+ 11 7	S		9 1 6	− 72	4 49	S		9 33 85	−1 57	32 28	0 27 79	7 7	0 000	− 0 153	0 27 604
	3123	+ 22 28	S		3 9 9	−1 84	8 06	S		3 47 36	− 57	45 79	27 73				
	3194	+ 25 4	S		16 28 05	−1 86	26 19	S		16 55 52	− 58	53 94	27 75				
Feb 10	2989	+ 44 9	N	I P W	8 43 46 44	+2 01	48 45	N	I P E	8 44 4 35	+1 68	16 03	0 27 58	2 677	000	− 0 155	0 27 522
	30 7	+ 40 38	N	d c − 9	48 35 12	+2 06	37 18	N	d c + 4	49 3 8	+ 70	4 88	27 70				
	3060	+ 38 3	N	b + 0 8 a + 2 2	52 44 44	+2 09	46 53	N	b + 1 + 4 6	53 2 58	+1 70	14 28	27 75				
				Q + 2 17					Q + 1 65								
	2937	+ 21 52	S		8 36 9 67	+2 24	11 91	S		8 36 37 97	+1 73	39 70	0 27 9	27 796	0 000	− 0 153	0 27 643
	2958	+ 0 3	S		38 2 5	+2 34	4 39	S		38 30 44	+1 76	32 20	27 81				
	2971	+ 6 50	S		40 12 49	+2 37	14 86	S		40 41 00	+1 74	42 74	27 88				
	2978	+ 6 16	S		41 51 89	+2 38	54 27	S		42 20 32	+1 74	22 06	27 79				
	3013	+ 5 46	S		45 51 22	+2 38	53 60	S		46 19 57	+1 74	21 31	27 71				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

PESHAWAR (E) *Lat 34° 0′ Long 4h 46m 22s* AND MOOLTAN (W) *Lat 30° 11 Long 4h 45m 56s*																	
Astronomical Date	Star		Transits Observed at E *By B rr rd with T lescope N 1*					Transits Observed at W *By St h with T les op N 2*					Diff n of C rre t d Times (W − E)		Correct f R te f W Clock	Corrns f Persl Equations $B_E - S_E = -0\ 55$ $B - S_S = -0\ 3$	ΔL + ρ
	B A C Numbe	Decli n ti n	Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1886					h m					h m		s	m				
Feb 10	3131	+ 43 41	N	*I P W*	9 5 53 75	− 3	5 43	N	*I P E*	9 6 2 65	− 6	9 3	27 6				
	3144	+ 35 6	N	d − 1 9	7 47 23	−2 2	45	N	d + 4	8 4 23	− 59	64	27 62	643	000	− 0 55	0 7 488
	3162	+ 37 7	N	b + 8 +2	7 85	− 23	5 62	N	b + + 4 6	11 44 84	− 6	43 3	27 6				
	3178	+ 34 52	N	Q − 2 17	3 39 48	−2 21	37 27	N	Q − 65	4 6 6	−1 59	5	27 74				
	3111	+ 7	S		9 6 99	−2 00	4 99	S		9 34 29	−1 55	3 74	27 75				
	3123	+ 8	S		32 53	−	8 43	S		3 47 70	−1 56	46 23	27 8	7 5	000	− 0 53	0 27 604
	3194	+ 25 40	S		16 28 67	−2 2	26 55	S		6 55 86	− 59	54 27	27 72				
Feb 11	2989	+ 44 9	N	*I P W*	8 43 45 39	+2 13	47 52	N	*I P W*	8 44 13 6	+1 86	5 47	0 27 95				
	3027	+ 4 38	N	d − 9	48 34 2	+ 3	36 34	N	d + 4 0	4) 2 28	+ 87	4 5	27 8	853	0 000	− 0 55	0 698
	3060	+ 38 3	N	b + 7 − 2	52 43 6	+2 3	45 73	N	b +) +	3 66	+1 87	3 53	27 80				
				Q + 2 1					Q + 1 6(								
	2937	+ 52	S		8 36 8 99	+2		S		8 36 37 08	+ 82	38 90	0 27 80				
	2958	+ 1 30	S		38 44	+2 12	3 56	S		38 29 57	+1 83	31 40	27 84				
	2971	+ 6 5	S		40 1 98	2 1	14 9	S		40 40	+1 82	4 94	27 85	848	000	− 0 53	0 7 695
	2978	+ 6 6	S		4 5 37	+2 1	53 48	S		4 9 47	8	2 29	27 8				
	3013	+ 5 46	S		45 5 6	+2	5 73	S		46 8 85	+ 8	2 67	27 94				
	3100	+ 38 44	N	Q − 2 11	8 59 6 11	−2 09	4 2	N	Q − s 66	8 59 33 23	− 46	3 77	0 27 75				
	3131	+ 43 4	N		9 5 52 72	−2 08	5 64	N		9 6 8 24	0 20	8 44	7 80				
	3144	+ 35 6	N		7 46 23	−2 09	44 4	N		8 3 36	−1 46	1 90	7 76	7 4	0 000	− 155	0 2 69
	3162	+ 37 17	N		11 16 82	−2 09	14 73	N		11 44 02	−1 45	4 57	27 84				
	3178	+ 34 52	N		3 38 5	−2 09	36 41	N		4 5 59	− 46	4 3	27 72				
	3111	+ 11 7	S		9 1 6 21	−2 11	4 10	S		9 1 33 44	−1 49	31 95	0 27 85				
	3123	+ 22 28	S		3 19 66	−2 10	17 56	S		3 46 89	−1 50	45 39	27 83	7 87	0 000	− 0 153	0 664
	3194	+ 25 40	S		16 27 84	−2 10	25 74	S		16 55 02	−1 51	53 51	27 77				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off and consequently in these cases Q = 0 00.

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

PESHAWAR (E) *Lat 34° 0′ Long 4h 46m 22s* AND MOOLTAN (W) *Lat 30° 11 Long 4h 45m 56s*

Astronomical Date	Star: B A C N mb r	Star: Decl nat	Transits Observed at E, *By B r a d with Telescope No 1*: Star Aspect	I trum ntal P ition and Correction Con ta ts	Mean Observed Time	T tal Correc tio	Second of Correct d Tim	Transits Observed at W, *By St h with T l op No 2*: Star Aspect	I strum tal I t n d Correct Co t ts	M Observ d T me	T t l Correc t	Seconds f C rr ct ed T me	Diffe of Corrected T mes (W − E): By each Star	M an of Group	Correction for Rate of W Clock	C rrns for Persl Equations $B_N - S_N = - 0^s\ 55$, $B_S - S_S = - 0\ 53$	$\Delta L + \rho$
1886					*h m s*					*h m*			*m*				
Feb 12	2989	+ 44 9	N	*I P E*	8 43 44 45	+ 2 29	46 74	N	*I P W*	8 44 12 53	+ 7	14 23	27 49	7 547	0 000	0 55	7 39
	3027	+ 40 38	N	*d* 0 + 3 b + 4 8 + 8 3	48 33 16	+ 2 31	35 47	N	*d* 0 + b + *a* − 4 9	49 37	+ 69	3 6	27 59				
	3060	+ 38 3	N		52 42 59	+ 2 28	44 87	N		53 0 76	+ 67	43	27 56				
				Q + 2 17					*s* Q + 6								
	2937	+ 21 52	S		8 36 8	+ 2 33	0 33	S		8 36 36 24	+ 1 63	37 87	0 27 54				
	2958	+ 10 30	S		38 0 45	+ 2 35	2 80	S		38 28 78	+ 6	3 39	27 59	27 540	0 000	− 0 53	0 27 387
	2971	+ 6 5	S		40 11 0	+ 35	13 35	S		4 39 27	+ 6	4 88	27 53				
	2978	+ 6 16	S		4 50 39	+ 2 34	52 73	S		4 8 6	+ 59	0	27 48				
	3013	+ 5 46	S		45 49 63	+ 2 35	5 98	S		46 17 93	+ 6	9 54	27 56				
	3100	+ 38 44	N	Q − 2 17	8 59 5 11	− 2 5	3 06	N	Q − 1 62	8 59 32 25	− 1 57	30 68	0 27 62				
	3131	+ 43 4	N		9 5 5 77	− 2 6	49 71	N		9 6 18 90	− 1 55	17 35	27 (4	27 59	0 000	− 0 155	0 27 437
	3144	+ 35 6	N		7 45 31	− 2 3	43 28	N		8 12 43	− 58	1 85	27 57				
	3162	+ 37 7	N		1 15 93	− 2 05	3 88	N		1 43 3	− 1 57	4 46	58				
	31 8	+ 34 52	N		13 37 56	− 2 04	35 52	N		14 4 65	− 1 58	3 07	27 55				
	3111	+ 1 7	S		9 1 5 2	− 99	3 2	S		9 1 32 54	− 65	30 89	0 27 67	7 680	0 000	− 0 153	0 27 527
	3123	+ 22 28	S		3 8 77	− 2 1	6 76	S		3 46 03	− 1 61	44 42	27 66				
	3194	+ 25 4	S		16 26 84	− 2 04	24 8	S		6 54	− 1 6	52 5	27 7				
Feb 17	2989	+ 44 9	N	*I P E*	8 43 40 58	+ 2 1	42 69	N	*I P E*	8 44 8 7	+ 1 67	10 38	0 27 69	27 677	0 000	− 0 155	0 27 522
	3027	+ 40 38	N	*d* + 3 b + 3 *a* + 26 4	48 9 3	+ 2 16	31 47	N	*d* 0 + 1 4 b + 2 *a* + 6 9	48 57 46	+ 1 68	59 14	27 67				
	3060	+ 38 3	N		52 38 67	+ 2 20	40 87	N		53 6 84	+ 1 70	8 54	27 67				
				Q + 2 5					Q + 1 62								
	2937	+ 21 52	S		8 36 3 82	+ 2 37	6 19	S		8 36 32 17	+ 1 73	33 90	0 27 71				
	2958	+ 1 30	S		37 56 3	47	58 79	S		38 24 59	+ 1 76	26 35	27 56	27 594	0 000	− 0 153	0 27 441
	2971	+ 6 50	S		40 6 83	+ 2 49	9 32	S		40 35 13	+ 1 76	36 89	27 57				
	2978	+ 6 16	S		41 46 20	+ 2 49	48 69	S		42 14 46	+ 1 76	16 22	27 53				
	3013	+ 5 46	S		45 45 42	+ 2 50	47 92	S		46 13 76	+ 1 76	15 52	27 60				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

PESHAWAR (E) Lat 34 0' Long 4 46 22 AND MOOLTAN (W) Lat 30° 11 Long 4 45 56

Astronomical Date	Star: B.A.C. Number	Star: Declination	Star Aspect	Transits Observed at E, By B rr d with Telescope No 1: Instrumental Constants; Clock Correction	Mean Observed Time	Total Correction	Sidereal Time of Culmination	Star Aspect	Transits Observed at W, By St h with Telescope No 2: Instrumental Constants; Clock Correction	Mean Observed Time	Total Correction	Sidereal Time of Culmination	Difference of Clock Times (W − E) By each Star	Mean of Group	Correction for Rate of W Clock	Correction for Personal Equation $B_W - \nu = -0^s$, $B_S - S = -0$	$\Delta L + \rho$
1886					h m					h							
Feb 17	3100	+ 38 44	N	I P E	8 58 6 5	–	59 4	N	I P E	8 59 8 47	– 54	6 93	7 89				
	3131	+ 43 4	N	d + 3	9 5 47)	– 8	45 74	N	d + 4	9 6 5 5	– 58	3 47	27 73	46	000	5	9
	3144	+ 35 6	N	b + 3 + 6 4	7 4 37	– 6	39 3	N	b + + 6)	8 8 4)	– 53	6)6	27 65				
	3162	+ 37 7	N	s	2	– 9	) 9	N		39	– 55	3 (	7	m		–	o
	3178	+ 34 5	N	Q – 2 5	3 33 57	–2 6	3 5	N	Q – 6	13 6 8	– 53	5) 7	27 76				
	3111	+ 7	S		9 0 6	–1 84	59 8	S		9 8 43	– 48	26 95	27 (7	6	000	3	46
	3123	+ 28	S		3 4 78	– 93	85	S		3 4 88	– 5	4 38	27 53				
	3194	+ 25 40	S		6 22 88	–)(	9	S		6 5	– 53	48 58	27 (6	m		–	
Feb 18	2989	+ 44 9	N	I P W	8 43 39 (	+ 35	4 6	N	I P E	8 44 7 7	+ 5	9 3	27 62	697	000	55	4
	3027	+ 4 38	N	d + 3	48 8 5	+ 34	3 39	N	d – 6	48 56 55	+ 5	58 7	7 (8				
	3060	+ 38 3	N	b + 3 – 4	5 37 3	+ 2 33	39	N	b – 7 + 6 5	53 5 96	53	7 49	27)	m		–	
				Q + 2 6					Q + 6								
	2937	+ 2 5	S		8 36 8	+ 2 9	5 9	S		8 36 3	+ 6	32 8	o 27 71				
	2958	+ 3	S		37 5 3	+ 8	57 58	S		38 3 63	+ (3	25 6	27 (8	6 6	000	0 53	483
	2971	+ 6 5	S		40 5)	+ 7	8 4	S		4 34 9	+ (4	35 83	27 59			o	
	2978	+ 6 (	S		41 45 6	2 26	47 5	S		4 3 4)	(3	5	7 6	m		–	
	3013	5 46	S		45 44 56	+ 7	46 83	S		46 9	+ (4	4 43	7 6				
	3100	+ 38 44	N	Q – 2 16	8 58 59 88	– 99	57 89	N	Q – 6	8 59 7 3	– ((	5 7	o 7 8				
	3131	+ 43 41	N		9 5 46 63	– 96	44 67	N		9 6 4 8	– 68	12 4	27 73	54	000	55	599
	3144	+ 35 6	N		7 4 12	– 00	38	N		8 7 54	– 66	5 88	7 6		o	o	
	3162	+ 37 17	N		1 0 7	–1 99	8 72	N		11 38 2	– (7	36 4	7 82	m o		–	o
	3178	+ 34 52	N		13 32 39	–2 00	30 39	N		13 59 69	–1 66	58 3	27 64				
	3111	+ 11 7	S		9 0 60 13	–2 04	58 09	S		9 1 27 38	– 58	5 8	27 7	7	000	53	7 554
	3123	+ 22 28	S		3 13 59	–2 02	11 57	S		3 40 96	–1 6	39 35	27 78	2	o	o	
	3194	+ 25 40	S		16 21 80	–2 01	19 79	S		16 49 05	– 63	47 42	27 63	m o		–	

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AMRITSAR (E) Lat 31 38 Long 4 59 39s AND PESHAWAR (W) Lat 34° 0' Long 4h 46 22s

Astronomical Date	Star: B A C Number	Star: Decl	Transits Observed at E (By St ah with Telescope No 2): Aspect	Instrumental Position and Corrections (constant)	Mean Observed Time	Total Correction	Sidereal Corrected Time	Transits Observed at W (By B rr rd with Tel No 1): Star Aspect	Instrumental Position and Correct Constants	Mean Observed Time	Total Correction	Sidereal Corrected Time	Diff of Corrected Times (W − E): By each Star	Mean of Group	Correct of Rate of E Clock	Corrns for Personal Equations $S_N - B_N = + 0^s 85$, $S_S - B_S = + 68$	$\Delta L - \rho$
1880					h m					h m			m				
Feb 24	2856	+ 38 25	N	I P W	8 25 8 84	1 56	4	N	I P W	8 8 4 8	+ 2 2	27 0	13 6 6	= 3 6 6 0	+ 0 03	+ 0 8	3 6 898
	2871	+ 36 49	N	d; a − 5; b − 2; a + 6 7	27 2 87	+ 1 58	4 45	N	d; − 1 3; b + 8; a − 6 9	40 18 86	+ 2	2 7	16 6				
	2896	+ 33 12	N		3 50 14	+ 1 58	5 7	N		44 6 1	+ 2 2	8 32	16 60				
	2908	+ 33 8	N	Q + 1 66	32 28 7	+ 58	9 75	N	Q + 2 19	45 44 6	+ 2 20	46 36	16 6				
	2880	19 59	S		8 28 4 53	+ 1 62	6 15	S		8 41 4 6	+ 2 18	42 79	3 16 64	= 3 6 6 5	+ 0 3	+ 0 168	3 6 9 6
	2925	+ 19 59	S		34 2 17	+ 6	3 9	S		47 8 29	+ 7	46	6 67				
	2937	+ 2 52	S		36 9 55	+ 1 62	1 17	S		49 35 (8	+ 2 8	37 86	16 69				
	2958	+ 10 3	S		38 12 4	+ 65	13 69	S		5 28 16	+ 2 5	3 3	16 62				
	2989	+ 44 9	N	Q − 1 66	8 43 59 4	− 1 78	57 63	N	Q − 2 19	8 57 6 43	− 2 3	4 30	3 16 67	= 3 6 655	+ 3	+ 85	3 6 943
	3027	+ 40 38	N		48 48 4	− 76	46 38	N		9 2 5 18	− 2 4	3 04	16 66				
	3060	+ 38 3	N		5 57 47	− 75	55	N		6 14 57	− 7	2 40	16 68				
	3100	+ 38 44	N		59 5 75	− 1 76	3 99	N		2 3 75	− 2 5	3 60	16 61				
	3013	+ 5 46	S		8 46 4 43	− 1 66	2 77	S		8 59 2 66	− 2 25	19 4	13 16 64	= 3 6 595	+ 1 3	+ 0 168	3 6 866
	3063	+ 28 2	S		54 42 6	− 7	4 89	S		9 7 59 68	− 2 9	57 49	16 60				
	3088	+ 28 2	S		57 3 7	− 7	98	S		7	− 2 9	8 52	16 54				
	3109	+ 30 7	S		9 0 50 85	− 72	49 13	S		14 7 91	− 2 18	5 73	16 60				
Mar 4	2856	+ 38 25	N	I P E	8 23 40 22	+ 59	4 8	N	I P W	8 36 56 05	+ 2 18	58 23	13 16 42	= 13 6 2 8	+ 0 3	+ 0 85	3 16 666
	2871	36 49	N	d; − 0 1; b − 0 7; + 9	25 34 3	59	35 90	N	d; c − 1 3; b + 8; − 5 1	38 5 05	+ 2 8	5 23	16 33				
	2896	+ 33 12	N		29 2 56	+ 60	23 16	N		42 3 39	+ 2 18	39 57	16 41				
	2908	+ 33 8	N	Q + 1 64	3 59 59	+ 1 62	6 21	N	Q + 2 19	44 15 38	+ 2 18	17 56	16 35				
	2880	+ 19 59	S		8 26 55 92	+ 1 65	57 57	S		8 40 11 89	+ 2 5	4 04	13 16 47	= 13 16 410	+ 0 103	+ 0 168	13 16 681
	2925	+ 9 59	S		32 33 65	+ 1 67	35 32	S		45 49 52	+ 2 15	51 67	16 35				
	2937	+ 21 52	S		34 50 95	+ 1 67	52 6	S		48 6 80	+ 2 15	9 01	16 39				
	2958	+ 10 30	S		36 43 43	+ 1 69	45 2	S		49 59 40	+ 2 15	61 55	16 43				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AMRITSAR (E) *L t 31 38′ Lo g 4 59m 39* AND PESHAWAR (W) *Lat 34° 0′ L g 4 46m 22s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By St al with Telescope No 2: Star Aspect	Instrumental Parameters and Collimation	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By B rr l with Telescope No 1: Star Aspect	Instrumental Parameters and Collimation	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Time (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrections for Personal Equation	$\Delta L - \rho$
1886					h m					h			m				
M 4	2989	+ 44 9	N	*I P E*	8 4 3 92	− 73	29 19	N	*I P W*	8 55 47 67	−2 19	45 48	3 16 29	3 6 3 5	+	+ 0 85	13 6 63
	30 7	+ 40 38	N	*d* − 0	47 19 59	− 7	7 89	N	*d* − 3	9 0 36 4	−2 18	34 24	16 35				
	3060	+ 38 3	N	b − 7 + 9 1	5 8 94	− 69	27 25	N	b + 8 − 5	4 45 9	−2 19	43 6	16 35				
	3100	+ 38 44	N	Q − 1 64	57 47 8	− 7	45 48	N	Q − 2 9	1 3 98	−2 9	1 79	16 3				
	3013	+ 5 46	S		8 44 35 7	− 57	34 20	S		8 57 52 89	− 27	5 6	13 16 42	3 6 388	+ 0 3	+ 168	3 6 69
	3069	+ 8	S		53 13 9	− 64	1 26	S		9 6 30 94	− 22	28 72	6 46				
	3088	+ 28 21	S		55 35 8	− 64	33 44	S		8 52 00	−2 1	49 9	6 35				
	3109	+ 30 7	S		59 22 3	− 65	65	S		2 39 8	− 2	36 97	16 32				
Mar 11	3238	+ 34 9	N	*I P E*	9 23 49 4	+ 55	5 95	N	*I P E*	9 37 5 34	+2 8	7 52	3 6 57	3 6 50	+ 008	+ 0 85	3 6 43
	3252	+ 37 0	N	*d* −	26 3 2	+1 53	3 65	N	*d* 0 − 3	39 46 3	+2 5	48 8	16 53				
	3281	+ 4 45	N	b − 3 a + 29	3 14 35	+ 46	5 8	N	b − + 12 1	44 30 25	+ 1	32 37	16 56				
	3297	+ 35 5	N	Q + 1 66	33 3 9	+1 52	5 43	N	Q + 2 9	46 9 81	+2 16	2 97	16 54				
	3309	+ 26 6	S		9 35 4 55	66	6	S		9 48 2 36	2 21	22 57	13 16 36	3 6 30	+ 0 008	+ 0 68	3 6 546
	3318	+ 20 43	S		36 59 07	+ 73	60 80	S		5 14 95	+2 27	7 22	16 42				
	3331	+ 24 8	S		39 39	69	4 8	S		5 38 8	+ 4	4 42	16 34				
	3343	+ 21 8	S		41 9 1	+ 3	2 84	S		54 34 96	+2 24	37 26	16 36				
	3375	+ 35 3	N	Q − 1 66	9 46 52 06	−1 78	50 28	N	Q − 2 19	0 8 98	−2 23	6 75	13 16 47	3 6 447	+ 0 008	+ 0 185	3 6 640
	3439	+ 35 33	N		59 8 95	−1 78	7 7	N		12 25 78	−2 22	3 56	16 39				
	3446	+ 35 48	N		0 45 25	−1 78	43 47	N		13 62 17	−2 22	59 95	16 48				
	3392	+ 32 55	S		9 49 53 12	− 75	5 37	S		10 3 9 90	−2 19	7 7	3 6 34	3 16 422	+ 008	+ 0 68	3 6 598
	3406	+ 12 59	S		52 8 13	−1 52	6 6	S		5 25 35	−2 10	23 25	16 64				
	3416	+ 32 29	S		54 29 18	−1 73	27 45	S		7 45 99	−2 19	43 80	6 35				
	3423	+ 22 30	S		56 30 41	− 61	28 8	S		9 47 30	−2 13	45 17	16 37				
	3460	+ 19 6	S		10 2 55 73	−1 58	54 15	S		16 12 67	−2 11	10 56	16 41				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK AND DEDUCTION

OF THE APPARENT DIFFERENCE OF LONGITUDES ΔL — ρ

AMRITSAR (E) *L t 31 38′ L g 4 59 39* AND PESHAWAR (W) *L t 34 0′ L g 4h 46 22s*

Astronomical Date	Star: B A C N b	Star: D l t	Transits Observed at E, *By St h w th T l cop N 2*: St Aspe t	I t o tal P t n d C rr t n C t t	Mean Ob rv d T me	Tot l C rr t	S c ds f C rr t ed 1	Transits Observed at W, *By B rr d th T l p N 1*: Star Aspect	I trum nt l P t l C rr t C t t	M a Ob rv d T	Total C t	S ds f C t d T	Diff f C rr te l T me (W − E): By h Sta	M an f G p	C rr t n f Rate of E Cl k	C rrn f P rsl Eq t $S_N - B_N = + 0\ 85$, $S_S - B_S = + 0\ 68$	ΔL − ρ
1886					*h m*					*h m*			*m*				
Mar 13	3 2	37	N	*I P W*	9 6 8 6	+ 56	9 8	N	*I P E*	9 39 43 95	+ 6	46 55	3 16 73				
	3281	+ 4 45	N	d − 5	3 32	+ 55	3 87	N	d − 3	44 28)	+ 59	3 68	6 8	≡ 3 6 7	+ 09	+ 85	3 6 95
	3297	+ 35 51	N	b − 5, a + 7 7	33 2 3	+ 56	3 59	N	b + (, + 3 8	46 7 6)	+ 2 63	32	6 73				
				Q + 1 66					Q + 2 6								
	3309	+ 26 (	S		9 35 2 71	+ 60	4 3	S		9 48 18 3	+ 2 67	20 80	3 6 49				
	3318	+ 2 43	S		36 57 25	+ 62	58 87	S		5 6(	+ 2 7	5 37	16 5	≡ 3 6 3	+ 9	+ 68	3 6 7
	3331	+ 4 8	S		39 20 53	+ 1 6	22 4	S		5 36 5	6)	38 74	6 6				
	3343	+ 2 8	S		4 7 35	+ 6	8 97	S		54 32 8	+ 7	35 5	6 55				
	3375	+ 35 31	N	Q − 66	9 4(5 14	− 1 6	48 38	N	Q − 2 6	0 0 68	− 2 57	5	3 6 73				
	3430	+ 35 33	N		59 6 9(	− 1 75	5	N		12 24 4	− 2 57	2 88	6 67	≡ 3 6 6 7	+ 009	+ 0 85	3 6 867
	3446	+ 35 48	N		0 0 43 36	− 76	4 6	N		3 6 79	− 5	58	6 62				
	3393	+ 32 55	S		9 49 5 4	− 75	49 3)	S		0 3 8 57	− 2 55	6	13 6 63				
	3406	+ 2 59	S		5 (47	− 67	4 8	S		5 23 88	− 2 46	4	6 6				
	3416	+ 32 29	S		54 7 3	− 73	5 59	S		7 44 73	− 2 56	4 7	16 58	≡ 3 6 58	+ 009	+ 68	3 6 759
	3423	+ 3	S		56 8 6	− 7	6 89	S		9 45 8)	− 49	43 4	6 5				
	3460	+ 9 6	S		0 2 54 04	−	5 34	S		16 39	− 2 48	8 9	6 57				
Mar 19	3238	+ 34 9	N	*I P W*	9 23 4 3	+ 73	43 5	N	*I P W*	9 36 57 11	+ 2 63	59 74	13 16 69				
	3 63	+ 37	N	d, c + 5, b + 9, − 3 8	6 22 5	+ 78	23 83	N	l, − 1 3, b + 1, + 2 3	39 37 79	+ 2 60	40 39	6 56	≡ 3 6 6 3	+ 006	+ 0 85	13 6 8 4
	3 81	+ 4 45	N		3 5 97	+ 84	7 81	N		44 2 98	+ 2 57	24 55	6 74				
	3297	+ 35 51	N	Q + 1 66	32 55 84	+ 1 76	57 6	N	Q + 2 64	46 11 48	+ 2 62	14 10	16 50				
	3309	+ 26 26	S		9 34 56 66	+ 1 61	58 27	S		9 48 12 13	+ 2 7	14 83	3 6 56				
	3318	+ 20 43	S		36 51 33	+ 1 55	52 88	S		50 6 74	+ 2 76	9 50	6 62	≡ 3 6 583	+ 0 006	+ 0 168	13 16 757
	3331	+ 24 18	S		39 14 51	+ 1 60	6 11	S		52 29 98	+ 2 71	32 69	16 58				
	3343	+ 21 8	S		41 11 46	+ 1 56	13 02	S		54 26 83	+ 2 6	29 59	16 57				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

AMRITSAR (E) *Lat 31 38′ L g 4 59ᵐ 39ˢ* AND PESHAWAR (W) *Lat 34° 0′ Long 4ʰ 46ᵐ 22ˢ*

Astronomical Date	Star		Transits Observed at E *By St aha w th T lescop No 2*					Transits Observed at W *By B rr d with T lescop No 1*					D ff re of Corrected Times (W − E)		Correction for Rate of E Clock	C rrns. for Persl Equati ns $S_E - B_E = +0^s 85$ $S - B_S = +0 68$	$\Delta L - \rho$
	B A C Numb	D cli nation	Sta A pe t	I t tal P t d C rr t on C t ts	Mean Ob rv d T me	T tal C rrec t n	S d f C t d T e	Star' Aspect	I trum tal Pos t a d C rrect C nsta ts	Mean Observed T me	T tal C rec tion	S de f C rr ct ed T me	By each Star	Mean of Group			
1886					*h*					*h m s*		*s*	*m s*				
Mar 19	3375	+ 35 3	N	*I P W*	9 46 44	− 57	42 45	N	*I P W*	9 59 6 69	− 2 66	59 3	3 16 58				
	3439	+ 35 33	N	*d* + 0 5 b + 9 − 30 8	58 60 81	− 58	59 23	N	*d* c − 1 3 b + + 2 3	0 2 18 5	− 2 65	5 86	16 63	m 3 6 63	+ 0 006	+ 0 85	3 16 804
	3446	+ 35 48	N		0 0 37 4	− 1 57	35 57	N		13 54 86	− 2 66	53 20	16 63				
				s Q − 1 66					Q − 2 64								
	3392	+ 32 55	S		9 49 45 0	− 1 6	43 49	S		1 3 2 64	− 2 64	00	3 16 5				
	3406	+ 59	S		5 6 74	− 85	58 89	S		5 7 9	− 2 47	5 44	16 55	m 3 6 53	+ 0 006	+ 0 68	3 6 697
	3416	+ 32 9	S		54 7	− 6	9 65	S		7 38 73	− 2 64	36 09	16 44				
	3423	+ 22 30	S		56 22 72	− 1 75	20 97	S		9 4	− 2 54	37 56	46 59				
Mar 20	3238	+ 34 9	N	*I P E*	9 23 41 13	+ 67	4 80	N	*I P W*	9 36 56 65	+ 2 57	59 22	13 6 42				
	3252	+ 37	N	*d* + 0 9 b − a + 4 6	6 84	66	3 5	N	*d* c − 3 b + 6 24 9	39 37 8	+ 54	39 92	16 4	m 3 6 443	+ 0 003	+ 0 85	3 6 67
	3281	+ 4 45	N		3 5 97	+ 65	7 6	N		44 53	+ 2 5	24 4	6 4				
	3297	+ 35 51	N	*s* Q 1 66	32 55 59	+ 1 65	57 24	N	Q + 2 60	46 11 19	2 56	13 5	16 51				
	3309	+ 6 26	S		9 34 56 3	+ 68	58 00	S		9 48 65	+ 2 67	4 32	3 6 32				
	3318	+ 20 43	S		36 50 90	+ 7	52 60	S		50 6 15	+ 2 73	8 88	16 28	m 3 6 33	+ 003	+ 0 68	3 6 494
	3331	+ 24 8	S		39 4 8	+ 69	5 87	S		5 9 52	+ 69	3 2	16 34				
	3343	+ 2 8	S		4 95	+ 7	65	S		54 6 28	+ 2 72	2) 00	6 35				
	3375	+ 35 31	N	*s* Q − 1 66	9 46 43 76	− 1 66	42 10	N	Q − 2 60	9 59 6 26	− 2 64	58 62	13 16 52				
	3439	+ 35 33	N		58 60 63	− 1 67	58 96	N		2 8 13	− 2 63	15 50	6 54	m 3 6 493	+ 0 003	+ 85	3 6 68
	3446	+ 35 48	N		10 36 99	− 66	35 31	N		13 54 38	− 2 63	51 75	6 42				
	3392	+ 32 55	S		9 49 44 85	− 1 65	43 20	S		10 2 62 19	− 2 61	59 58	3 6 38				
	3406	+ 12 59	S		51 60 18	− 1 61	58 57	S		5 17 41	− 2 4	5 00	16 43				
	3416	+ 32 29	S		54 20 98	− 1 65	19 33	S		7 38 33	− 2 60	35 73	16 40	m 3 6 403	+ 0 003	+ 168	13 6 5 3
	3423	+ 22 30	S		56 22 24	− 1 63	20 61	S		9 39 57	− 2 50	37 07	16 46				
	3460	+ 19 6	S		10 2 47 66	− 1 6	46 05	S		16 4 85	− 2 46	2 39	16 34				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AMRITSAR (E) Lat 31 38 Long 4h 59m 39 AND PESHAWAR (W) Lat 34° 0 L g 4 46 22

Astronomical Date	Star: B A C Number	Star: Decl.	Transits Observed at E (By St h n with T l cop No 2): Star Aspect	Instrumental Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By B rr d with T les op No 1): Star Aspect	Instrumental Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Time (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corr for Personal Equation $S_W - B_W = +0^s 85$, $S_E - B_E = +0\ 68$	$\Delta L + \rho$
1886					h m					h m			m				
F b 24	3238	+ 34 9	N	I P W	9 34 64	+ 57	36 2	N	I P W	) 35 8	+ 2	53	3 6 79	= 3 6 85	− 008	+ 0 85	3 6 968
	3252	+ 37 0	N	d − 1 5	13 5 35	+ 1 56	6 9	N	d − 1 3	26 3 5	+ 2 9	33 69	16 78				
	3281	+ 4 45	N	b − + 6 7	17 59 5	+ 54	61 6	N	b + 8 + 6 9	3 15 64	+ 2 8	7 82	16 76				
	3297	+ 35 5	N	Q + 1 65	19 49 7	+ 1 56	5 63	N	Q + 2 19	33 5 25	+ 2 9	7 44	16 8				
	3309	+ 2(26	S		9 2 49 70	+ 6	5 3	S		9 35 5 93	+ 2 23	8 6	3 6 86	= 3 6 88	− 008	+ 68	3 7 46
	3318	+ 20 43	S		23 44 28	+ 1 61	45 89	S		37 0 45	+ 2 24	69	16 8				
	3331	+ 24 18	S		26 7 47	+ 1 60	9 07	S		39 23 79	+ 2 23	26 02	16 95				
	3343	+ 21 8	S		28 4 28	+ 1 6	5 89	S		4 20 56	+ 2 24	22 8	6 9				
	33 5	+ 35 31	N	Q − 1 65	9 33 37 17	− 1 74	35 43	N	Q − 2 19	9 46 54 37	− 2 8	52 19	13 16 76	= 3 6 83	− 008	+ 0 85	3 6 966
	3430	+ 35 33	N		45 53 97	− 74	52 23	N		59 11 8	− 2 8	9 0	16 77				
	3446	+ 35 48	N		47 3 32	− 74	28 58	N		1 0 47 56	− 2 6	45 4	16 82				
	3392	+ 32 55	S		9 36 38 17	− 1 3	36 44	S		9 49 55 43	− 2 17	53 26	13 16 82	= 3 6 854	− 002	+ 0 168	3 7 2
	3406	+ 13 59	S		38 53 4	− 1 66	5 75	S		52 10 76	− 4	8 62	16 87				
	3416	+ 32 29	S		41 4 28	− 73	55	S		54 3 5	− 2 16	29 35	6 80				
	3428	+ 22 30	S		43 15 49	− 69	13 80	S		56 32 85	− 2 5	3 70	16 9				
	3460	+ 9 6	S		49 40 90	− 1 69	39 21	S		0 2 58 23	− 2 14	56 09	16 88				
Mar 4	3238	+ 34 9	N	I P E	9 10 36 04	+ 1 58	37 62	N	I P W	9 23 52 04	+ 2 7	54 21	13 16 59	= 13 6 6 5	− 0 0	+ 0 185	13 16 798
	3252	+ 37 0	N	d c − 0 1	13 6 74	+ 1 54	8 28	N	d − 1 3	26 32 7	+ 2 16	34 86	16 58				
	3281	+ 4 45	N	b − 7 a + 23 9	8 9(	+ 50	2 46	N	b + 0 8 + 10 5	3 6 95	+ 2 13	9 08	16 62				
	3297	+ 35 51	N	Q + 1 6	9 5 49	+ 1 55	52 04	N	s Q + 2 19	33 6 55	+ 2 16	8 1	6 67				
	3309	+ 26 26	S		9 21 5 1	+ 66	52 77	S		9 35 7 6	+ 2 20	9 36	13 6 59	= 13 16 633	− 0 002	+ 0 168	13 16 799
	3318	+ 20 43	S		23 45 62	+ 1 74	47 36	S		37 1 76	+ 2 24	4 00	16 64				
	3331	+ 24 18	S		26 8 93	+ 1 70	10 63	S		39 25 05	+ 2 22	27 27	16 64				
	3343	+ 2 8	S		28 5 70	+ 1 70	7 40	S		41 21 83	+ 2 23	24 06	16 66				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AMRITSAR (E) *Lat 31 38′ Lo g 4 59ᵐ 39ˢ* AND PESHAWAR (W) *Lat 34° 0′ Lo g 4 46ᵐ 22ˢ*

Astro mical Date	Star: B A C Numb	Star: Decl ti n	Transits Observed at E (By St h w th T l scop N 2): Sta Asp ct	Transits Observed at E: I strum t l Po t a d C t (t t	Transits Observed at E: M Ob rved Time	Transits Observed at E: Total C rec t on	Transits Observed at E: S nd f C t 1 1	Transits Observed at W (By B d th T l op No 1): Star Aspe t	Transits Observed at W: I t m tal P s t d C t C t t	Transits Observed at W: M Ol rv d T m	Transits Observed at W: 1 t l C t on	Transits Observed at W: S c d f C t 1 1 m	D ff ren of Cor ected T n es (W − E): By each Sta	D ff ren of Cor ected T n es (W − E): Me of Gro p	Correctio f Rate f W Clock	Corrns. fo P al Equations $S_E - B_E = + 0^s 85$ $S_S - B_S = + 0\ 68$	ΔL + ρ
1886					h					l							
Mar 4	3375	+ 35 3	N	*I P E*	9 33 38 65	−1 69	36 9(	N	*I P W*	9 4(55 7	−2 2	53 49	13 6 53	= 3 6	− 0 8	+ 0 85	3 6 703
	3439	+ 35 33	N	*d* −	45 55 5	−	53 79	N	*d* − 3	59 53	− 2	3	16 52				
	3446	+ 3 48	N	b − 7 +23)	47 3 8	− 68	3 4	N	b + 8 *a* + 0 5	0 0 48 86	−2 21	46 65	16 51				
				Q − 63					Q − 2 9								
	3392	32 55	S		9 36 39 63	− 67	37 96	S		9 49 5(7	− 2	54 5	3 16 55	= 3 6 564	− 0 8	+ 0 68	3 6 730
	3406	2 59	S		38 54 8	− 47	53 35	S		5 2 5	−2	9 93	16 58				
	3416	+ 32 29	S		41 5 8	− 65	4 15	S		54 32 86	− 9	30 67	16 52				
	3423	+ 2 3	S		43 6 94	− 55	5 39	S		5(34	− 5	3)5	6 56				
	3460	+ 9 6	S		49 42 35	−1 53	40 82	S		0 2 59 56	−2 13	57 43	6 61				
Mar 11	3584	+ 39 30	N	*I P E*	0 2 07	+1 5	3 58	N	*I P E*	3 7 92	+2 8	3	3 6 5	= 3 6 4	+ 8	+ 8	3 6 677
	3602	+ 32 58	N	*d* − 1	7 84	+ 56	9 4	N	*d* − 3	5 3 73	+2 8	5)	6 5				
	3610	+ 35 35	N	b − 3 +15 2	3 44 53	+ 55	46 8	N	b − 2 − 2 4	27 0 5	+2 17	2 68	16 60				
	3625	+ 36 55	N	Q + 64	16 33 7	+1 54	35 25	N	Q + 2 19	29 49 6	+2 8	51 78	6 53				
	3650	+ 28 7	S		10 20 47 06	+1 6	48 67	S		34 3 1	+2 17	5 7	13 16 60	= 3 6 600	+ 8	+ 0 168	13 6 770
	3666	+ 26 56	S		23 30 95	+ 6	32 57	S		36 47	+ 17	49 8	6 6				
	3684	+ 3 5	S		26 1 69	+ 73	3 42	S		39 7 82	+2 6	9 98	6 56				
	3696	+ 6 57	S		28 8 06	+ 72	9 78	S		41 24 24	+2 7	26 41	16 63				
	3728	+ 34 50	N	Q − 1 64	0 33 44 20	−1 74	42 46	N	Q − 2 9	0 46 61 3	−2 21	59 02	13 16 56	= 13 16 5	+ 0 003	+ 0 185	3 6 0
	3736	+ 34 39	N		35 26 2	− 74	24 28	N		48 42 97	−2 21	40 76	16 48				
	3757	+ 41 2	N		39 53 02	− 78	51 24	N		53 9 95	−2 20	7 75	16 5				
	3811	+ 36 56	N		49 50 95	−1 73	49 22	N		11 3 7 96	−2 20	5 76	16 54				
	3751	+ 26 7	S		10 37 11 21	−1 66	9 53	S		10 50 28 21	−2 20	26 01	3 16 46	= 13 6 443	+ 0 003	+ 0 68	13 6 663
	3785	+ 4 5	S		44 54 09	−1 54	52 55	S		58 11 22	−2 21	9 01	16 46				
	3797	+ 26 9	S		47 45 19	−1 66	43 53	S		11 0 62 14	−2 21	59 93	16 40				
	3824	+ 15 1	S		52 32 94	−1 60	31 34	S		5 50 00	−2 21	47 79	16 45				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

AMRITSAR (E) *Lat 31 38′ Long 4h 59m 39* AND PESHAWAR (W) *Lat 34° 0′ Long 4 46m 22s*

Astronomical Date	Star		Transits Observed at E — *By Strahan with Telescope No 2*					Transits Observed at W — *By Burrard with Telescope No 1*					Difference of Corrected Time (W − E)		Correction for Rate of W Clock	Corrn for Personal Equations $S_E - B_W = + 0^s 185$, $B_S - B_S = + 68$	$\Delta L + \rho$
	BAC Number	Declination	Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1886					h m					h m s			m				
Mar 13	3584	+ 39 30	N	*I P W*	0 10 1 38	+ 1 62	3	N	*I P E*	0 23 27	+ 60	9 7	3 6 71				
	3602	+ 32 58	N	*d* c − 1 5	12 7 20	+ 58	8 78	N	*d* − 3	25 89	+ 2 65	25 54	16 6				
	3610	+ 35 35	N	b − 5 − 8 4	13 43 93	+ 1 60	45 53	N	b + 6 + 3 8	26 59 67	+ 2 63	62 3	16 77	= 3 6 58	− 008	+ 0 85	3 6 94
	3625	+ 36 55	N	Q + 1 66	16 33 04	+ 60	34 64	N	Q + 2 60	29 48 80	+ 2 63	51 43	16 79				
	3650	+ 28 7	S		1 2 46 56	+ 57	48 3	S		0 34 2 25	+ 2 69	4 94	3 16 8				
	3666	+ 26 56	S		23 30 45	+ 57	32 02	S		36 46 07	+ 68	48 75	16 73				
	3684	+ 3 5	S		26 1 35	+ 1 50	2 85	S		39 6 78	+ 2 8	19 59	16 74	= 3 6 8	−	+ 0 68	3 6 945
	3696	+ 6 57	S		28 7 72	+ 1 51	9 23	S		41 23 28	+ 2 78	26 6	6 83				
	3728	+ 34 50	N	Q − 1 66	10 33 43 56	− 1 73	41 83	N	Q − 2 60	10 46 61 25	− 2 56	58 69	13 6 86				
	3736	+ 34 39	N		35 25 37	− 1 73	23 64	N		48 42 98	− 2 6	40 42	16 8				
	3757	+ 41 2	N		39 52 34	− 1 7	50 63	N		53 10	− 2 60	7 41	16 78	= 3 6 80	− 08	+ 0 85	3 6 989
	3811	+ 36 56	N		49 50 3	− 1 72	48 58	N		11 3 7 95	− 2 57	5 38	6 8				
	3751	+ 26 7	S		0 37 0 71	− 1 76	8 95	S		50 28 20	− 2 51	25 69	13 16 74				
	3785	+ 4 15	S		44 53 81	− 1 82	5 99	S		58 1 16	− 2 4	8 76	16 77				
	3797	+ 26 9	S		47 44 6	− 75	4 85	S		1 0 6 6	− 2 52	59 64	16 79	= 3 6 7	− 08	+ 0 68	13 16 917
	3824	+ 15 1	S		52 32 6	− 1 79	30 8	S		5 49 96	− 2 45	47 51	6 7				
Mar 19	3584	+ 39 3	N	*I P W*	10 10 13 74	+ 86	5 60	N	*I P W*	1 23 29 73	+ 2 61	32 34	13 16 74				
	3602	+ 32 58	N	*d* c + 0 5	2 9 79	+ 1 72	11 51	N	*d* − 1 3	25 25 51	+ 2 62	28 13	16 62				
	3610	+ 35 35	N	b + 0 9 a − 43 6	13 46 43	+ 1 78	48 21	N	b + a + 7 3	27 2 27	+ 2 62	4 89	16 68	= 3 6 675	− 0 005	+ 0 185	13 16 855
	3625	+ 36 55	N	Q + 1 66	16 35 56	+ 81	37 37	N	Q + 2 63	29 51 42	+ 2 6	54 03	16 66				
	3650	+ 28 7	S		10 20 49 29	+ 1 62	50 91	S		10 34 4 82	+ 2 64	7 46	13 16 55				
	3666	+ 26 56	S		23 33 11	+ 1 59	34 70	S		36 48 8	+ 2 66	51 44	16 74				
	3684	+ 3 5	S		26 4 36	+ 1 22	5 58	S		39 19 49	+ 2 71	22 20	16 62	= 13 16 650	− 0 005	+ 0 168	13 16 813
	3696	+ 6 57	S		28 10 72	+ 1 27	11 99	S		41 25 98	+ 2 70	28 68	16 69				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

AMRITSAR (E) *Lat 31 38′ Long 4 59m 39* AND PESHAWAR (W) *Lat 34° 0′ Long 4h 46m 22*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star Aspect	Instrumental Parameters and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Bird with Telescope No 1): Star Aspect	Instrumental Parameters and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $S_W - B_W = + 0.8$, $S_E - B_E = + 0.68$	$\Delta L + \rho$
1886					h m					h m	s	s	m s				
Mar 19	3728	+ 34 50	N	*I P W*	33 46)	− 1 55	44 64	N	*I P W*	4 3 99	− 2 64	1 35	13 16 71	3 6 68	− 005	+ 0 18	3 6 808
	3736	+ 34 3)	N	d + 0 5	35 27 99	− 56	26 43	N	d − 1 3	48 45 71	− 63	43 08	16 (5				
	3757	+ 4	N	b + 9; −43 6	39 54 88	− 42	53 46	N	b + 1 1; + 7 3	53 73	− 2 66	1 7	16 6				
	3811	+ 36 56	N	Q − 1 66	49 52 98	− 1 51	5 47	N	Q − 2 63	3 6(	− 2 65	8 01	16 54				
	3751	+ 26 7	S		37 13 43	− 4	1 69	S		0 50 3 95	− 2 62	28 33	3 6 64	3 6 643	− 8	+ 0 68	3 6 806
	3785	+ 4 5	S		44 56 82	− 2 08	54 74	S		58 3 97	− 55	4	6 68				
	3797	+ 26 9	S		47 47 43	− 74	45 69	S		1 1 4 93	− 2 60	2 33	16 64				
	3824	+ 15 1	S		52 35 52	− 92	33 60	S		5 52 8	− 2 57	5 2	6 6				
Mar 20	3584	+ 39 3	N	*I P E*	0 0 14 66	+ 1 71	6 37	N	*I P W*	23 3 45	54	3 99	3 16 6	3 6	− 0 006	+ 0 R5	3 6 04
	3602	+ 3 58	N	d + 9	2 54	+ 69	2 3	N	d − 1 3	25 26 22	+ 2 5)	28 8	16 48				
	3610	+ 35 35	N	b − 2; − 9 8	3 47 3	+ 7	49 01	N	b + 6; + 3	27 2 92	+ 2 57	5 49	(48				
	3625	+ 36 55	N	Q + 1 67	16 36 51	1 7	38 22	N	Q + 2 60	29 52 08	+ 2 56	54 64	6 4				
	3650	+ 28 7	S		10 20 5 00	+ 66	5 66	S		0 34 5 48	+ 2 62	8	3 16 44	3 6 4	− 006	+ 0 168	13 6 633
	3666	+ 26 56	S		23 33 85	+ 1 66	35 5	S		36 49 37	+ 2 64	5 01	16 50				
	3684	+ 3 5	S		6 4 8	59	6 39	S		39 20 12	+ 2 74	2 86	6 47				
	3696	+ 6 57	S		28 1 20	+ 59	12 79	S		41 26 54	+ 2 2	29 26	16 47				
	3728	+ 34 50	N	Q − 1 67	0 33 47 00	− 64	45 36	N	Q − 2 60	0 47 4 6	− 2 62	1 99	13 16 63	13 6 605	− 0 006	+ 0 185	13 6 84
	3736	± 34 39	N		35 28 77	− 64	27 3	N		48 46 35	− 2 62	43 73	16 60				
	3757	+ 4 2	N		39 55 75	− 1 62	54 13	N		53 13 34	− 2 66	69	16 55				
	3811	+ 36 56	N		49 53 73	− 1 64	52 09	N		11 3 11 36	− 2 63	8 73	16 64				
	3751	+ 26 7	S		10 37 14 14	− 1 68	12 46	S		10 50 31 49	− 2 57	28 92	13 16 46	13 16 5 0	− 0 006	+ 0 168	13 16 672
	3785	+ 4 15	S		44 57 26	− 1 76	55 50	S		58 14 50	− 2 46	12 04	16 54				
	3797	+ 26 9	S		47 48 13	− 1 69	46 44	S		1 1 5 52	− 2 57	2 95	16 51				
	3824	+ 15 1	S		52 36 02	− 1 72	34 30	S		5 51 33	− 5	5 83	16 53				

OF THE APPARENT DIFFERENCE OF LONGITUDES ΔL − ρ

DEHRA DŪN (E) *L t 30° 19′ Long 5ʰ 12ᵐ 23ˢ* AND AMRITSAR (W) *Lat 31 38′ Long 4ʰ 59ᵐ 39ˢ*

Astronomical Date	Star: B A C Number	Star: D li n t n	Transits Observed at E, *By St h with Telescope No 2*: Star Aspect	Instrumental Position and Correction C t t	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, *By B rrard with T lescope No 1*: Star Aspect	Instrumental Position and Correction C t t	Mean Observed Time	Total Correction	Seconds of Corrected Time	Diff e c f Corrected T m (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns fo Persl Equations $S_N - B_N = + 0^s 99$ $S_S - B_S = + 0\ 94$	ΔL − ρ
1886					*h*	*s*				*h m*							
Apr 1	3913	+ 43 48	N	*I P E*	24 09	+ 87	96	N	*I P E*	3(5 5	+ 5	53 66	4 7	= 4 633	+ 0 30	+ 0 199	4 862
	3952	+ 44 16	N	*d* c + 2 3	32 5 27	+ 1 88	7 15	N	*d* c − 3 5	44 47 24	+ 51	48 75	41 60				
	3966	+ 32 23	N	b + *a* − 11 4	35 27 4	+ 80	29 2	N	b − 2 8 + 2 2	48 9 27	+ 1 6	10 88	41 67				
	3973	+ 42 2	N	Q + 1 7	37 24 26	+ 1 86	26	N	Q + 1 78	50 6 6	+ 52	7 68	4 56				
	3900	+ 3 29	S		1 2 53 89	+ 1 67	55 56	S		1 34 35 49	+ 1 78	37 27	2 4 71	= 4 635	+ 0 30	+ 0 194	2 4 859
	3919	+ 15 0	S		25 4 11	+ 1 7	4 82	S		38 2 7	+ 7	24 42	4 60				
	3937	+ 8 25	S		30 7 5	+ 8	8 93	S		42 48 93	+ 65	5 58	4 65				
	3962	+ 1 35	S		34 22 88	+ 1 66	24 54	S		47 4 33	+ 1 79	6 12	41 58				
	3998	+ 35 34	N	Q − 1 7	43 38 84	− 1 58	37 26	N	Q − 1 78	11 56 20 83	− 1 97	8 86	12 41 60	= 4 543	+ 03	+ 0 199	4 77
	4010	+ 38 32	N		4(17 10	− 57	15 53	N		58 59	− 2	56 98	4 45				
	4018	+ 41 33	N		47 47 78	− 1 54	4(4	N		12 0 29 85	− 2 03	27 82	41 58				
	4031	+ 16 17	S		49 41 37	− 1 69	39 68	S		2 23 17	− 1 84	21 33	12 4 65	= 4 598	+ 0 030	+ 0 194	2 41 8
	4039	+ 4 7	S		52 (09	− 1 74	4 35	S		4 57 75	− 1 79	55 96	41 6				
	4072	+ 9 22	S		59 16 83	− 70	15 3	S		58 58	− 81	56 77	41 64				
	4079	+ 10 18	S		12 1 14 16	− 1 71	12 45	S		13 55 75	− 1 81	53 94	41 49				
Apr 2	3913	+ 43 48	N	*I P W*	24 6 43	+ 1 99	8 42	N	*I P E*	11 36 48 62	+ 1 54	50 6	12 41 74	= 12 4 863	+ 0 03	+ 0 199	12 42 093
	3952	+ 44 16	N	*d* c + 1	32 1 47	+ 2 00	3 47	N	*d* c − 3 5	44 43 93	+ 1 54	45 47	42 00				
	3966	+ 32 23	N	b − 4 *a* − 4 4	35 23 82	+ 1 74	25 56	N	b − 1 6 *a* + 13 5	48 5 83	+ 66	7 49	4 93				
	3973	+ 42 21	N	*s* Q + 1 70	37 20 58	+ 1 95	22 53	N	*s* Q + 1 79	50 2 76	+ 1 55	4 31	41 78				
	3900	+ 3 29	S		11 21 50 69	+ 1 27	5 96	S		11 34 32 02	+ 1 83	33 85	12 41 89	= 12 41 860	+ 0 031	+ 0 194	12 42 085
	3919	+ 15 0	S		25 37 79	+ 1 44	39 23	S		38 19 32	+ 1 76	21 08	41 85				
	3937	+ 18 25	S		30 3 74	+ 1 67	5 41	S		42 45 53	+ 1 68	47 21	41 80				
	3962	+ 1 35	S		34 19 70	+ 1 26	20 96	S		47 1 03	+ 1 83	2 86	41 90				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

DEHRA DŪN (E) *Lat 30° 19′ Long 5h 12m 23s*; AND AMRITSAR (W) *Lat 31 38′ Long 4h 59m 39s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Burrard with Telescope No 1: Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl. Equations $S_E - B_W = +0^s 199$, $S_E - B_E = +0\ 94$	$\Delta L - \rho$
1886					h m					h m s							
Ap 2	3998	+ 35 34	N	*I P W*	43 35 28	−1 6	33 67	N	*I P E*	56 7 46	−1 95	15 5	12 4 84	12 4 8	+ 03	+ 0 199	12 4 958
	4010	+ 38 3	N	d c + 0 1	46 3 49	− 53	11 96	N	d − 3 5	58 55 64	−1 98	53 66	4 70				
	4018	+ 4 33	N	b − 0 4 −40 4	47 44 15	− 48	42 67	N	b − (a + 3 5	2 6 46	−2 0	24 44	4 77				
	4059	+ 43 44	N	Q − 1 70	56 3 83	− 4	29 43	N	Q − 7)	9 3 18	−2 03	11 15	41 2				
	4031	+ 16 17	S		1 49 38 09	− 94	3(15	S		2 2 9 75	−1 8	17 94	2 4 79	12 4 98	+ 0 03	+ 0 194	2 42 023
	4039	+ 4 7	S		52 2 95	−2	1 84	S		4 54 38	− 7(	52 (2	4 78				
	4072	+ 9	S		59 13 58	−2 04	11 54	S		55 18	− 78	53 4	4 86				
	4079	+ 0 8	S		2 11 89	−2 3	8 86	S		13 52 4	−1 9	50 62	41 76				
Apr 3	3913	+ 43 48	N	*I P W*	1 24 2 67	+2 09	4 76	N	*I P W*	3(44 99	+1 5	46 50	2 41 74	12 4 65	+ 0 043	+ 0 99	12 42 006
	3952	+ 44 6	N	d c + 0 1	31 57 78	+	59 89	N	d − 3	44 40 4	+1 5	4 (5	41 76				
	3966	+ 32 23	N	b + 2 a −45 4	35 20	+1 81	2 0	N	b − 4 + 8 5	48 2 26	+1 58	3 84	4 83				
	3973	+ 4 2	N	Q + 1 70	3 16 87	+2 5	18)	N	Q + 1 77	49 59 4	+ 51	6 65	4 73				
	3900	+ 3 9	S		1 2 47 07	+ 29	48 36	S		11 34 28 6	+1 70	3 31	12 4 95	12 4 908	+ 0 043	+ 0 194	12 42 44
	3919	+ 5 0	S		25 34 4	+1 45	35 59	S		38 5 7	+ 66	7 38	41 79				
	3937	+ 28 25	S		30	+1 72	1 74	S		42 42 3	+ 6	43 (4	41 9				
	3962	+ 1 35	S		34 16 05	+ 5	17 3	S		46 57 58	+1 71	59 29	41 99				
	3998	35 34	N	Q − 1 70	11 43 31 62	− 51	30 1	N	Q − 1 77	1 56 13 8	− 98	11 83	12 41 72	12 41 98	+ 0 042	+ 0 199	4 039
	4010	+ 38 32	N		46 9 74	−1 45	8 29	N		58 5 06	−1 99	50 7	4 8				
	4018	+ 4 33	N		47 40 46	−1 38	39 08	N		12 0 22 82	−1 99	20 83	41 75				
	4059	+ 43 44	N		56 27 10	−1 31	25 79	N		9 9 75	−2 0	7 73	41 94				
	4031	+ 16 17	S		11 49 34 42	−1 92	32 50	S		12 2 16 15	−1 90	14 25	12 41 75	12 4 70	+ 0 043	+ 0 94	12 4 006
	4039	+ 4 7	S		52 9 30	−2 10	7 20	S		4 50 83	− 85	48 98	41 78				
	4072	+ 9 22	S		59 9 96	−2 03	7 93	S		11 51 61	−1 86	49 75	41 82				
	4079	+ 10 18	S		12 1 7 22	−2 01	5 21	S		13 48 80	−1 86	46 94	41 73				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

DEHRA DŪN (E) *Lat* 30° 19′ *Long* 5ʰ 12ᵐ 28ˢ; AND AMRITSAR (W) *Lat* 31 38′ *Long* 4ʰ 59ᵐ 39ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard with Telescope No 1): Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Time (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Personal Equations $S_E - B_W = +0^s.199$, $S_S - B_S = +0.194$	$\Delta L - \rho$
1886					h m	s	s			h m			m				
Apr 10	3918	+ 43 48	N	*I P E*	1 23 2 71	+ 1 7	24 41	N	*I P W*	1 36 3 55	+ 2 51	6 06	4 65	= 1 4 583	+ 0 57	+ 0 99	2 4 839
	3952	+ 44 1(	N	d c − 0 7	31 17 81	+ 1 70	19 5	N	d − 1	43 58 56	+ 2 52	61 08	41 57				
	3966	+ 32 23	N	b + 0 1 − 4 1	34 39 97	+ 72	4 69	N	b − 2 8 a − 9 8	47 2 71	+ 2 47	23 8	41 49				
	3973	+ 42 21	N	s Q + 1 69	36 36 80	+ 1 71	38 51	N	Q + 2 62	49 7 62	+ 2 5	2 3	4 62				
	3900	+ 3 29	S		1 2 6 4	+ 1 64	8 5	S		33 47 39	+ 2 38	49 77	2 41 72	= 4 657	+ 0 57	+ 0 194	2 4 908
	3919	+ 15	S		24 53 63	+ 65	55 28	S		37 34 5	+ 2 43	36 93	4 65				
	3962	+ 1 35	S		33 35 33	+ 1 62	36 95	S		46 16 6	+ 2 39	8 55	4 6				
	3998	+ 35 34	N	s Q − 1 69	1 42 51 42	− 1 69	49 73	N	Q − 2 62	11 55 34 06	− 2 75	31 31	12 41 58	= 4 603	+ 057	+ 0 99	12 4 859
	4010	+ 38 32	N		45 29 62	− 1 69	2 93	N		58 12 30	− 2 75	9 55	41 62				
	4018	+ 41 33	N		46 (34	− 1 68	58 66	N		59 42 98	− 2 75	40 23	41 57				
	4059	+ 43 44	N		55 47 08	− 1 68	45 40	N		2 8 29 77	− 2 73	27 04	41 64				
	4031	+ 16 17	S		11 48 53 87	− 1 73	52 14	S		2 1 36 52	− 2 81	33 71	12 41 57	= 2 4 608	+ 57	+ 0 94	4 859
	4039	+ 4 7	S		5 28 6	− 1 75	26 86	S		4 1 34	− 2 85	8 49	4 63				
	4072	+ 9 22	S		58 29 30	− 1 75	37 55	S		11 2 02	− 2 83	9 19	4 64				
	4079	+ 10 8	S		2 0 26 63	− 1 73	24 90	S		13 9 32	− 2 83	6 49	41 59				
Apr 11	3918	+ 43 48	N	*I P E*	1 23 15 64	+ 1 2	17 36	N	*I P E*	1 35 56 36	+ 2 62	58 98	12 41 62	= 12 4 590	+ 0 062	+ 0 99	12 41 851
	3952	+ 44 6	N	d c + 0 3	3 1 74	+ 1 2	2 46	N	d c − 3 5	43 5 49	+ 2 62	54 11	41 65				
	3966	+ 32 23	N	b + 1 6 a − 2 6	34 32 94	+ 1 68	34 62	N	b − 6 a − 17 7	47 13 65	+ 2 52	16 17	41 55				
	3978	+ 42 21	N	s Q + 1 64	36 29 77	+ 1 2	31 49	N	s Q + 2 65	49 10 43	+ 2 60	13 03	41 54				
	3900	+ 3 29	S		11 20 59 40	+ 1 65	61 05	S		11 33 40 27	+ 2 36	42 63	12 41 58	= 12 41 628	+ 0 062	+ 0 194	12 41 884
	3919	+ 15	S		24 46 53	+ 1 66	48 19	S		37 27 38	+ 2 41	29 79	41 60				
	3937	+ 28 25	S		29 12 70	+ 1 69	14 39	S		41 53 52	+ 2 50	56 02	41 63				
	3962	+ 1 35	S		33 28 30	+ 1 65	29 95	S		46 9 31	+ 2 34	11 65	41 70				

DEHRA DŪN (E) *Lat 30° 19′ Long 5h 12m 28s*; AND AMRITSAR (W) *Lat 31 38′ Long 4h 59m 39s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E — By Strahan, with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Second of Corrected Time	Transits Observed at W — By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Second of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Persl Equations $S_W - B_W = + 0^s.99$, $S_S - B_S = + 0.94$	ΔL − ρ
1886					h m					h m		s	m				
Apr 11	4010	+ 38 32	N	*I P E*	1 45 22 42	−1 58	20 84	N	*I P E*	1 58 5 15	−2 73	2 42	12 41 58	s 4 80	+ 0 062	+ 0 199	12 41 84
	4018	+ 41 33	N	d + 0 3 b + 6 a − 2 6 Q − 1 64	46 53 9	− 56	5 63	N	d c − 3 5 b − 1 6 a −17 7 s Q − 2 65	59 35 92	−2 71	33 21	41 58				
	4031	+ 16 17	S		48 46 65	− 62	45 03	S		2 1 29 52	−2 87	26 65	12 41 62	s 4 88	+ 0 06	+ 0 94	4 844
	4039	+ 4 7	S		5 1 4	− 63	9 78	S		4 4 34	−2 94	1 40	41 62				
	4072	+ 9 22	S		58 22 9	− 62	20 47	S		11 4 98	−2 91	2 07	41 60				
	4079	+ 10 18	S		0 19 47	−1 61	17 86	S		12 62 28	−2 9	59 37	4 51				
Ap 12	3918	+ 43 48	N	*I P E*	1 23 8 62	+1 69	10 31	N	*I P W*	35 49 34	+2 57	51 91	12 41 60	s 4	+ 63	+ 99	2 4 8
	3952	+ 44 6	N	d + 0 3 b + 1 6 − 3 5 Q + 1 6	3 3 75	+ 68	5 43	N	d − 3 1 b − 3 4 −2 3 Q + 2 63	43 44 40	+2 58	46 98	41 55				
	3966	+ 32 3	N		34 25 93	+ 66	27 59	N		47 6 65	+2 47	9 12	4 53				
	3973	+ 42 21	N		36 22 79	+ 69	4 48	N		49 3 46	+2 54	6 00	4 52				
	3900	+ 3 29	S		11 20 52 41	+1 62	54 03	S		11 33 33 26	+2 28	35 54	12 41 51	s 4 480	+ 063	+ 0 94	2 4 37
	3919	+ 15 0	S		24 39 6	+ 63	4 24	S		37 2 4	+ 33	2 75	4 5				
	3937	+ 8 25	S		9 5 73	+ 66	7 39	S		4 46 4	+ 45	48 83	41 46				
	3962	+ 1 35	S		33 21 33	+ 61	22 94	S		46 2 12	+2 26	4 38	41 44				
	3998	± 35 34	N	s Q − 1 6	42 37 4	−1 55	35 59	N	s Q − 2 63	1 55 19 98	−2 7	17 2	2 4 62	s 12 4 5 3	+ 0 063	+ 0 199	4 8
	4018	+ 41 33	N		46 46 12	−1 53	44 58	N		59 28 79	−2 71	26 08	41 50				
	4059	+ 43 44	N		55 32 88	−1 54	31 34	N		12 8 15 56	−2 68	2 88	4 54				
	4031	+ 16 17	S		11 48 39 65	−1 59	38 06	S		12 1 22 47	−2 91	19 56	12 4 50	s 4 445	+ 0 063	+ 0 94	4
	4039	+ 4 7	S		51 14 41	−1 60	12 81	S		3 57 20	−2 98	54 22	41 41				
	4072	+ 9 22	S		58 15 08	−1 59	13 49	S		10 57 89	−2 96	54 93	41 44				
	4079	+ 0 18	S		12 0 12 40	−1 59	0 81	S		12 55 19	−2 95	52 24	41 43				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

DEHRA DŪN (E) *Lat 30° 19′ Long 5ʰ 12ᵐ 23ˢ* AND AMRITSAR (W) *Lat 31° 38′ Long 4ʰ 59ᵐ 39ˢ*

Astronomical Date	Star: B A C Number	Star: D l nation	Transits Observed at E (By Strah with T lescop N 2): Star s A pect	In strum ntal Positi n and Correction C t nts	Mean Obs rved Time	Total C rr c tion	Seconds of Correct ed Time	Transits Observed at W (By B rrard with Telescope No 1): Star Aspect	In trum ntal P ti n a d Correction Co ta ts	Mean Ob rved Time	Total Correc tion	Seconds of C rrect ed Time	Diff rence f Corrected Times (W − E): By each Star	Mean of Gro p	Correcti n f Rate of W Clock	Corrns fo Persl Equations $S_W - B_W = +0^s 199$, $S_E - B_E = +0\ 94$	$\Delta L + \rho$
1880					h m		s			h m			m				
Apr 1	4233	+ 33 53	N	*I P E* *d* + 2 3 b + 0 − 11 4 Q + 1 70	12 15 46 91	+ 1 8	48 72	N	*I P E* *d* o − 3 5 b − 2 8 + 13 0 Q + 1 75	2 28 28 99	+ 1 56	30 55	12 41 83	m 4 830	− 0 00	+ 99	2 4 998
	4250	+ 9 25	S		12 19 6 4	+ 1 69	8 09	S		12 31 48 14	+ 1 73	49 87	12 41 ,8				
	4260	+ 2 41	S		21 11 97	+ 1 73	13 70	S		33 53 8	+ 1 66	55 47	4 77	m 4 70	− 0 3	+ 0 194	4 933
	4267	+ 11 3	S		23 34 83	+ 1 69	36 52	S		36 16 58	+ 1 7	8 30	41 78				
	4277	− 0 57	S		25 31 96	+ 1 66	33 62	S		38 3 60	+ 1 77	5 37	4 75				
	4408	+ 39 8	N	Q − 1 70	12 52 15 58	− 56	4 02	N	Q − 1 75	3 4 57 79	− 1 99	55 80	12 41 78				
	4415	+ 39 6	N		52 37 45	− 1 57	35 88	N		5 19 71	− 1 98	17 ,3	41 85	m 4 837	− 0 3	+ 0 199	2 42 005
	4433	+ 40 45	N		56 21 12	− 1 56	19 56	N		8 3 44	− 2 00	1 44	41 88				
	4393	+ 28 10	S		2 50 14 64	− 1 6	3 02	S		13 2 56 65	− 1 88	54 77	12 4 75	m 12 4 800	− 0 3	+ 0 94	12 4 963
	4440	+ 10 1	S		58 55 56	− 1 70	53 86	S		11 37 48	− 1 77	35 1	41 85				
Apr 2	4233	+ 33 53	N	*I P W* *d* o + 0 b − 0 4 − 39 6 *s* Q + 1 70	12 15 50 23	+ 1 77	52 00	N	*I P E* *d* o − 3 5 b − 1 6 c + 19 0 *s* Q + 1 77	12 28 32 39	+ 1 62	34 01	12 42 01				
	4285	+ 39 54	N		27 23 89	+ 89	25 78	N		40 6 22	+ 1 56	7 78	42 00	m 12 41 990	− 0 031	+ 0 199	12 42 158
	4311	+ 38 8	N		32 33 83	+ 1 86	35 69	N		45 16 07	+ 1 38	17 65	41 96				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

DEHRA DŪN (E) *Lat* 30° 19′ *Long* 5h 12m 28s AND AMRITSAR (W) *Lat* 31 38′ *Long* 4h 58m 89s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By St aka with Telescope No 9): Star's Aspect	Instrumental Position and Corrections Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard with Telescope No 1): Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl. Equations $S_E - B_E = + 0^s 99$, $S_N - B_N = + 0 94$	$\Delta L + \rho$
1886					h m s	s				h m	s	s	m s				
Ap 2	4250	+ 9 25	S	*I P W*	2 19 1 08	+1 36	11 44	S	*I P E*	12 31 51 69	+1 81	53 50	12 42 06				
	4260	+ 21 4	S	d c + 0 1	2 15 48	+1 55	7 03	S	d − 3 5	33 57 33	+1 73	59 06	42 03				
	4267	+ 1 3	S	b − 4 −39 6	23 38 46	+ 39	39 85	S	b − 6 a +19 0	36 2 4	+ 80	84	41 99	12 4	− 0 3	+ 0 94	12 42 73
	4277	− 0 57	S		5 35 73	+ 23	36 96	S		38 17 13	+1 89	19 02	42 06				
	4299	+ 14 11	S	Q + 1 7	3 20 42	+1 43	21 85	S	Q + 1 77	43 99	+1 77	3 76	41 91				
	4384	+ 36 25	N	Q − 1 70	2 48 16 27	−1 58	4 69	N	Q − 1 77	3 0 58 61	−1 95	56 66	12 41 97				
	4408	+ 39 8	N		52 8 86	−1 53	7 33	N		4 6 43	−1 97	59 46	42 3				
	4415	+ 39 6	N		52 40 74	− 52	39 22	N		5 23 31	−1 97	21 34	42 2	12 42 040	− 0 031	+ 0 199	4 208
	4420	+ 41 24	N		54 9 7	−1 49	8 2	N		6 52 27	−2 02	50 25	42 04				
	4433	+ 40 45	N		56 24 43	−1 48	22 95	N		9 6 90	−2 01	4 89	41 94				
	4367	+ 1 34	S		44 22 27	−2 1	2 6	S		2 57 4 0	−1 74	2 27	12 42 01				
	4393	+ 28 1	S		50 8 3	−1 75	16 28	S		3 2 60 20	−1 87	58 33	42 05	12 4	− 0 03	+ 0 94	2 42 80
	4440	+ 0	S		58 59 24	−2 3	57 2	S		1 40 93	−1 73	39 20	41 99				
Apr 8	4233	+ 33 53	N	*I P W*	12 15 53 6	+ 84	55 48	N	*I P W*	2 28 36 00	+1 55	37 55	2 42 10				
	4285	+ 39 54	N	d c + 0	27 27 33	+1 97	29 30	N	d c − 3 1	40 9 80	+1 54	11 34	42 04	12 4 090	− 0 031	+ 0 199	2 42 258
	4311	+ 38 8	N	b + 2 0 a −41 6	32 37 23	+1 93	39 16	N	b − 4 a +10 8	45 19 75	+1 54	21 29	42 13				
	—			s Q + 1 70					s Q + 1 77								
	4250	+ 9 25	S		2 19 13 52	+1 40	14 92	S		12 31 56 96	−0 08*	56 88	12 41 96				
	4260	+ 21 41	S		21 18 93	+1 59	20 52	S		34 0 89	+1 63	2 52	42 00				
	4267	+ 11 3	S		23 41 87	+1 43	43 30	S		36 23 61	+1 68	25 29	41 99	12 42 0 3	− 31	+ 0 194	1 4
	4277	− 0 57	S		25 39 17	+1 26	40 43	S		38 20 83	+1 72	22 55	42 12				
	4299	+ 14 1	S		30 23 89	+1 46	25 35	S		43 5 67	+1 67	7 34	41 99				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

DEHRA DŪN (E) *Lat* 30° 19′ *Long* 5ʰ 12ᵐ 23ˢ AND AMRITSAR (W) *Lat* 31 38′ *Long* 4ʰ 59ᵐ 39ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $S_N - B_N = +0^s 199$, $S_S - B_S = +194$	$\Delta L + \rho$
1886					h m		s			h m			m				
Apr 8	4384	+ 36 25	N	*I P W*	12 48 19 66	−1 51	18 15	N	*I P W*	13 1 2 22	−1 97	0 25	2 42				
	4408	+ 39 8	N	d c + 0 1	52 22 20	−1 45	20 75	N	d c − 3 1	5 4 89	−2 00	2 89	42 14				
	4415	+ 39 6	N	b + 2 0 a − 4 6	52 44 14	−1 44	42 70	N	b − 4 a + 1 8	5 26 78	− 99	24 79	42 09	m 42 074	− 03	+ 0 99	2 42 242
	4420	+ 41 24	N	s Q − 1 70	54 3 14	− 40	74	N	Q − 1 77	6 55 75	−2 3	53 72	4 98				
	4433	+ 40 45	N		56 27 82	−1 42	26 40	N		9 10 48	−2 02	8 46	42 06				
	4367	+ 11 34	S		2 44 25 71	−1 95	23 76	S		12 57 7 63	−1 85	5 78	12 42 02				
	4393	+ 28 0	S		50 21 44	−1 68	19 76	S		3 3 3 79	−1 94	1 85	42 09	m 2 4 40	− 0 3	+ 0 94	42 3
	4440	+ 10 1	S		59 2 67	−1 99	0 68	S		11 44 53	−1 84	42 69	42 01				
Apr 11	4233	+ 33 53	N	*I P E*	2 16 19 96	+1 66	21 62	N	*I P E*	2 29 0 94	+2 50	3 44	12 41 82				
	4285	+ 39 54	N	d c + 0 3	27 53 84	+1 65	55 49	N	d − 3 5	40 34 70	+2 54	37 24	4 75	m 12 41 7	− 0 030	+ 0 199	12 4 939
	4311	+ 8 8	N	b + 1 6	33 3 68	+ 66	5 34	N	b − 1 6 a − 14 0	45 44 55	2 53	47 08	41 74				
				Q + 1 61					Q + 2 62								
	4250	+ 9 25	S		12 19 39 43	+1 65	41 08	S		2 32 20 42	+2 38	22 80	12 4 72				
	4260	+ 2 4	S		21 45 04	+1 66	46 70	S		34 25 99	+2 43	28 42	41 72				
	4267	+ 11 3	S		24 7 86	+1 66	9 52	S		36 48 84	+2 39	51 23	41 71	m s 12 41 72	− 0 30	+ 0 194	12 41 876
	4277	− 0 57	S		26 4 98	+1 65	6 63	S		38 46 5	+2 35	48 40	41 77				
	4299	+ 14 1	S		30 49 94	+1 66	51 60	S		43 30 85	+2 39	33 24	41 64				
	4384	+ 36 25	N	s Q − 1 61	12 48 45 98	−1 56	44 42	N	Q − 2 62	13 1 29 00	−2 72	26 28	12 41 86				
	4408	+ 39 8	N		52 48 60	− 56	47 04	N		5 31 67	−2 71	28 96	4 92				
	4415	+ 39 6	N		53 10 44	−1 56	8 88	N		5 53 53	−2 71	50 82	41 94	m s 12 41 874	− 0 030	+ 0 199	12 42 043
	4420	+ 41 24	N		54 39 51	−1 55	37 96	N		7 22 46	−2 68	19 78	41 82				
	4433	+ 40 45	N		56 54 21	−1 56	52 65	N		9 37 18	−2 70	34 48	41 83				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

DEHRA DŪN (E) *Lat 30° 19′ Long 5h 12m 28s* AND AMRITSAR (W) *Lat 31 38′ Long 4h 59 39s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strah with Telescope V 2): Star's Aspect	Instrumental Position and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Barrard with Telescope N 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Time (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl. Equations $S_W - B_W = +0^s 99$, $S_E - B_E = +0\ 94$	$\Delta L + \rho$
1886					h m s					h m s			m				
Apr 11	4367	+ 11 34	S	*I P E*	12 44 5 56	− 56	5 00	S	*I P E*	2 57 34 63	− 2 85	3 78	2 41 78	= 4 87	− 0 030	+ 0 194	2 4 91
	4393	+ 28 0	S	d + 3	50 47 58	− 1 56	4(2	S	d − 3 5	3 3 30 59	− 77	27 82	4 8				
	4440	+ 10	S	b + (−	59 28 48	− 57	6 91	S	b − 6 − 4 0	54	− 2 85	8 (9	41 78				
				Q − 61					Q − 2 62								
Apr 12	4283	+ 33 53	N	*I P E*	2 6 23 39	+ 67	25 (	N	*I P W*	2 29 4 35	+ 2 5	6 85	2 41 79	= 4 63	− 0 3	+ 0 99	4 93
	4285	+ 39 54	N	d + 3	27 57	+ 67	58 88	N	d − 3 1	4 38 3	+ 56	40 69	4 8				
	4311	+ 38 8	N	b + 6, a − 2 4	33 7 14	+ 1 67	8 8	N	b − 3 4, − 17 2	45 47 97	+ 2 53	50 50	41 69				
				Q + 1 6					Q + 2 65								
	4250	+ 9 25	S		12 19 4 87	+ 1 64	44 5	S		12 32 23 88	2 35	26 3	2 4 72	= 4 6	− 0 30	+ 194	1 4 836
	4260	+ 21 4	S		48 5	+ 1 65	5 17	S		34 29 4	+ 2 4	31 82	4 65				
	4267	+ 11 3	S		24 1 35	+ 1 64	2 99	S		36 52 6	+ 2 3(	54 6	4 (3				
	4277	− 0 57	S		26 8 46	+ 62	1 08	S		38 49 49	+ 2 3	5 80	4 72				
	4299	+ 4 1	S		30 53 39	+ 63	55 02	S		43 34 29	+ 2 37	36 (6	41 64				
	4384	+ 36 25	N	Q − 1 61	2 48 49 43	− 1 56	47 87	N	Q − 2 65	3 1 32 28	− 2 78	29 5	2 41 63	= 4 654	− 0 030	+ 0 99	1 4 823
	4408	+ 39 8	N		52 52 05	− 1 55	5 50	N		5 34 9	− 2 76	32 6	41 66				
	4415	+ 39 6	N		53 3 94	− 55	2 39	N		5 56 8	− 2 76	54 06	41 67				
	4420	+ 41 24	N		54 42 94	− 1 55	4 39	N		7 25 80	− 2 75	23 05	41 66				
	4433	+ 40 45	N		56 57 60	− 1 55	56 05	N		9 40 47	− 2 77	37 70	4 65				
	4367	+ 11 34	S		12 44 54 99	− 1 58	53 41	S		12 57 37 96	− 94	35	12 41 61	= 12 4 60	− 0 030	+ 0 94	41 4
	4393	+ 28 10	S		50 5 04	− 1 56	49 48	S		13 3 33 9	− 2 84	3 7	41 59				
	4440	+ 10 1	S		59 31 95	− 1 59	30 36	S		2 4 93	− 2 94	1 99	41 63				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

DEHRA DŪN (E) *L t 30° 19 Long 5ʰ 12ᵐ 28ˢ* AND AGRA (W) *Lat 27° 10′ Long 5ʰ 12ᵐ 14ˢ*

Astronomical Date	Star: B A C Numb	Star: D l t	Transits Observed at E (By St ah w th Telescope No 2): Star A pe t	I st umental Position d Correction C nstants	Mean Ob rved Time	Total C rre tion	Seconds of C ect d Time	Transits Observed at W (By Burrard with Tel s ope No 1): Star Aspect	In strumental Position a d Correct on C tants	M n Ob rved Time	Tot l C rr tion	Seconds of Corr ct ed Time	Diff rence of Corrected Times (W − E): By each Star	Me n f Group	Correction fo Rate of E Clock	Corrns fo Persl Equations $S_N - B_N = +0^s 187$, $S_s - B_s = +0$ 1	$\Delta L - \rho$
1886					h s	s	s			h m	s						
Apr 20	4233	+ 33 53	N	*I P E*	12 28 5 37	+ 65	7 2	N	*I P E*	2 28 1 01	+ 2 03	4 04	0 7 2				
	4285	+ 39 54	N	d c + 1 2 b − 0 2 − 11 7	39 39 13	+ 1 69	40 82	N	d c − 2 6 b − 2 8 a − 25 6	39 45 63	+ 2	47 74	6 9	s 0 6 937	0 000	+ 0 87	0 7 4
	4311	+ 38 8	N		44 49 04	+ 1 67	50 71	N		44 55 50	+ 2 08	57 58	6 87				
				s Q + 1 60					s Q + 2 09								
	4250	+ 9 25	S		12 31 24 99	+ 1 52	26 51	S		2 31 31 59	+ 1 79	33 38	0 6 87				
	4260	+ 21 4	S		33 30 5)	+ 1 59	32 18	S		33 37 08	+ 1 91	38 99	6 8				
	4267	+ 11 3	S		35 53 39	+ 1 53	54 92	S		35 59 98	+ 1 8	6 79	6 87	s 0 6 864	0 000	+ 0 21	0 7 75
	4277	− 0 57	S		37 50 53	+ 1 49	52 02	S		37 57 21	+ 7	58 9	6 89				
	4299	+ 14 11	S		42 35 42	+ 1 55	36 97	S		42 42 01	+ 1 84	43 85	6 88				
	4300	+ 31 24	N	Q − 1 60	12 54 55 78	− 1 57	54 21	N	s Q − 2 09	12 55 3 29	− 2 19	1 10	0 6 89				
	4408	+ 39 8	N		13 4 33 76	− 1 52	32 24	N		3 4 41 29	− 2 09	39 2	6 96				
	4416	+ 39 6	N		4 55 65	− 53	54 2	N		5 3 6	− 2 10	1 06	6 94	s 6 906	0 000	+ 0 187	0 7 093
	4420	+ 41 24	N		6 24 64	− 1 50	23 4	N		6 32 12	− 2 06	30 6	6 92				
	4433	+ 40 45	N		8 39 39	− 1 49	37 9	N		8 46 79	− 2 07	44 72	6 82				
	4367	+ 11 34	S		2 56 36 88	− 1 66	35 22	S		2 56 44 50	− 2 37	42 13	0 6 91	s 0 6 865	0 000	+ 0 211	0 7 076
	4393	+ 28 10	S		13 2 32 89	− 1 58	31 31	S		13 2 40 35	− 2 22	38 13	6 82				
Apr 21	4.33	+ 33 53	N	*I P W*	12 28 4 49	+ 1 6	6 10	N	*I P E*	2 28 11 25	2 03	13 28	0 7 18				
	4285	+ 39 54	N	d c + 0 2 b − 7 a − 4	39 38 32	+ 1 65	39 97	N	d − 2 6 b − 8 a − 13 3	39 44 96	+ 2 09	47 05	7 08	s 0 7 33	000	+ 0 187	0 7 320
	4311	+ 38 8	N		44 48 4	1 63	49 77	N		44 54 86	+ 2 05	56 91	7 4				
				s Q + 1 60					s Q + 2 10								
	4250	+ 9 25	S		12 31 24 16	+ 1 47	25 63	S		12 31 30 80	+ 1 91	32 71	0 7 08				
	4260	+ 2 4	S		33 29	+ 1 55	31 25	S		33 36 32	+ 98	38 30	7 5				
	4267	+ 11 3	S		35 52 53	+ 1 49	54 02	S		35 59 16	+ 1 91	61 07	7 05	s 0 7 054	0 000	+ 0 211	0 7 265
	4277	− 0 57	S		37 49 75	+ 1 44	51 19	S		37 56 38	+ 1 86	58 24	7 05				
	4299	+ 14 11	S		42 34 58	+ 1 5	36 08	S		42 41 20	+ 1 92	43 12	7 04				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

DEHRA DŪN (E) *Lat* 30° 19′ *Long* 5ʰ 12ᵐ 28ˢ AND AGRA (W) *Lat* 27° 10′ *Lo g* 5ʰ 12ᵐ 14ˢ

Astronomical Date	Star: B A C Number	Star: Decli nation	Transits Observed at E (By St aha with Telescope No 2): Star Aspe t	In trum nt l P t on and Correct n C t t	Mean Ob erved Time	Total Correq tion	Seconds of Corrĕct ed Time	Transits Observed at W (By B rrard with T lescope No 1): Star s A pect	I strumental Pos tion and Correct on Consta ts	Mean Observed Time	Total Correc tion	Sec nds of Correct ed T me	Differe ce of Corrected T mes (W − E): By each Star	Mean of Group	Correction for Rate of E Clo k	Corrns. for Persl Equat n $S_E - B_E = +0^s.87$, $S_E - B_E = +0.11$	$\Delta L - \rho$
1886					h m					h m s			m s				
Apr 21	4360	+ 31 24	N	*I P W*	12 54 54 94	−1 60	53 34	N	*I P E*	2 55 2 62	−2 9	0 43	0 7 09	[illegible]	000	+ 0 187	0 7 257
	4433	+ 40 45	N	d + 2 b − 0 7 a −14 1 Q − 1 60	3 8 38 62	−1 55	37 07	N	d c − 2 (b − 1 8 a −13 3 Q − 2 10	3 8 46 24	−2 12	44 12	7 05				
	4367	+ 11 34	S		2 56 36 14	−1 71	34 43	S		12 56 43 72	−2 29	41 43	0 7 00	[illegible]	000	+ 0 2 1	0 7 246
	4387	+ 21 46	S		3 0 53 77	− 66	52 11	S		3 0 61 4	−2 3	59 18	7 07				
Apr.22	4233	+ 33 53	N	*I P W*	2 8 3 6	+ 67	5 28	N	*I P W*	2 28 10 1	+2 22	2 32	0 7 04	083	000	+ 0 8,	0 7 20
	4265	+ 39 54	N	d c + 0 2 b + 0) a − 3 0 Q + 1 60	39 37 32	+1 68	39 00	N	d c + 1 0 b + 8 −19 6 Q +2 10	39 43 80	+2 31	46 11	7 11				
	4311	+ 38 8	N		44 47 1	+1 69	48 86	N		44 53 68	+2 28	55 96	7 1				
	4250	+ 9 25	S		23 3 23	+1 5	4 75	S		12 31 29 71	+2 04	31 75	0 7 00				
	4260	+ 21 4	S		33 28 73	+1 58	30 31	S		33 35 23	+2 12	37 35	7 04		0 000	+ 0 2 1	0 7 23
	4267	+ 11 3	S		35 5 59	+1 53	53 2	S		35 58 08	+2 05	60 3	7 01				
	4277	− 0 57	S		37 48 8	+ 47	5 9	S		37 55 3	+1 95	57 26	6 97				
	4299	+ 14 1	S		42 33 62	+1 54	35 6	S		42 40 13	+2 07	42 20	7 04				
	4360	+ 31 24	N	Q − 1 60	2 54 54 00	−1 57	52 43	N	Q − 2 0	12 54 61 45	−2 01	59 44	0 7 01				
	4406	+ 39 8	N		13 4 3 03	−1 50	30 55	N		13 4 39 46	−1 90	37 56	7	000	0 000	+ 0 187	0 87
	4415	+ 39 6	N		4 53 96	−1 50	52 46	N		4 61 34	−1 90	59 44	6 98				
	4420	+ 41 24	N		6 22 96	−1 48	21 48	N		6 30 30	−1 89	28 41	6 93				
	4433	+ 40 45	N		8 37 58	−1 50	36 08	N		8 45 04	−1 89	43 5	7 07				
	4367	+ 11 34	S		12 56 35 16	−1 67	33 49	S		12 56 42 64	−2 15	40 49	0 7 00	7 003	0 000	+ 0 2	0 7 4
	4387	+ 21 46	S		13 0 52 82	−1 61	51 21	S		13 0 60 30	−2 08	58 22	7 01				
	4393	+ 28 10	S		2 31 15	−1 59	29 56	S		2 38 57	−2 01	36 56	7 00				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

DEHRA DŪN (E) *Lat* 30° 19′ *Long* 5ʰ 12ᵐ 23ˢ AND AGRA (W) *Lat* 27° 10′ *Long* 5ʰ 12ᵐ 14ˢ

Astronomical Date	Star		Transits Observed at E *By Strahan with Telescope No 2*					Transits Observed at W *By Burrard with Telescope No 1*					Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns. for Persl. Equations $S_N - B_N = +0^s\ 87$; $B_S - B_E = +0\ 21$	$\Delta L - \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1886					h m s	s				h m		s	m				
Apr 23	4238	+ 33 53	N	I P E	12 28 2 68	+ 1 67	4 35	N	I P W	12 28 9 29	+ 2 05	11 34	0 6 99				
	4285	+ 39 54	N	d c + 2	39 36 40	+ 1 68	38 08	N	d − 4	39 42 90	+ 2 14	45 04	6 96	s 0 6 97	0 000	+ 0 187	0 7 64
	4311	+ 38 8	N	b + 0 6 a − 8 3	44 46 29	+ 1 68	47 97	N	b − 1 7 a − 1	44 52 84	+ 2 1	54 95	6 98				
				s Q + 1 62					Q + 2 10								
	4250	+ 9 25	S		12 31 22 23	+ 1 56	23 79	S		2 31 28 99	+ 1 74	30 73	6 94				
	4260	+ 21 41	S		33 27 81	+ 1 6	29 42	S		33 34 45	+ 1 89	36 34	6 9				
	4267	+ 11 3	S		35 50 64	+ 1 57	52 21	S		35 57 34	+ 1 76	59 10	6 89	s 0 6 90	0 000	+ 0 2	7 3
	4277	− 0 57	S		37 47 8	+ 1 55	49 36	S		37 54 63	+ 64	56 27	6 9				
	4299	+ 14 11	S		42 32 69	+ 1 59	34 28	S		42 39 34	+ 1 79	41 13	6 85				
	4360	+ 31 24	N	s Q − 1 62	2 54 53 15	− 1 59	51 56	N	s Q − 2 10	12 54 60 69	− 2 18	58 51	0 6 95				
	4408	+ 39 8	N		13 4 31 23	− 1 56	29 67	N		3 4 38 67	− 2 07	36 60	6 93	s 0 6 90	0 000	+ 0 87	0 7 097
	4415	+ 39 6	N		4 53 10	− 1 57	5 53	N		4 60 56	− 06	58 5	6 9				
	4420	+ 4 24	N		6 22 2	− 1 55	20 65	N		6 29 47	− 2 3	27 44	6 79				
	4367	+ 11 34	S		12 56 34 28	− 1 67	32 6	S		12 56 4 96	− 2 43	39 53	0 6 92				
	4387	+ 21 46	S		13 0 51 96	− 1 63	50 33	S		3 0 59 56	− 2 3	57 25	6 92	s 6 933	0 000	+ 0 211	0 7 44
	4393	+ 28 10	S		2 3 8	− 1 61	28 67	S		2 37 86	− 2 23	35 63	6 96				
Apr 24	4233	+ 33 53	N	I P E	2 28 2 32	+ 1 59	3 91	N	I P E	12 28 9 00	+ 1 97	10 97	0 7 06				
	4285	+ 39 54	N	d c + 0 2	39 36 07	+ 1 63	37 70	N	d c − 2 6	39 42 74	+ 2 03	44 77	7 07	s 0 7 063	0 000	+ 0 187	0 7 250
	4311	+ 38 8	N	b − 1 9 a − 17	44 45 98	+ 6	47 59	N	b − 3 3 a − 16 6	44 52 65	+ 2 00	54 65	7 06				
				Q + 1 60					Q + 2 08								
	4250	+ 9 25	S		12 31 21 95	+ 1 42	23 37	S		12 31 28 70	+ 1 84	30 54	0 7 17				
	4260	+ 2 4	S		33 7 5	+ 50	29 01	S		33 34 6	+ 90	36 06	7 05				
	4267	+ 11 3	S		35 50 34	+ 1 43	51 77	S		35 56 99	+ 1 85	58 84	7 07	s 0 7 072	0 000	+ 0 211	0 7 283
	4277	− 0 57	S		37 47 53	+ 1 37	48 90	S		37 54 21	+ 1 77	55 98	7 08				
	4299	+ 14 1	S		42 32 43	+ 1 46	33 89	S		42 39 03	+ 1 85	40 88	6 99				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES ΔL − ρ

DEHRA DŪN (F) L t 30° 19′ Lo g 5 12ᵐ 28ˢ AND AGRA (W) Lat 27° 10 L g 5ʰ 12ᵐ 14

A tro omical Date	Star: B A C Numbe	Star: D l ti n	Transits Observed at E, By Strah w th T les p N 2: St A pe t	I t m tal P t C t C t t	M Ob erved T m	T tal C rrec ti n	S d f C t ed 1	Transits Observed at W, By B rr d th T l p N 1: Sta A pe t	I t tal P t d C rr t C t t	M Ob d T	T t l C re t	S l f C t d T	D ff f C rrected T mes (W − E): By ach Star	Mean f G	C rrecti f Rat f E Cl k	C rrn f P rsl Eq t $S_W - B_E = + 0^s.87$ $S - B_S = +$	ΔL − ρ
1886					h					)							
Apr 24	4360	+ 3 24	N	*I P E*	2 54 5 8	−1 63	5 8	N	*I P E*	54 6 33	− 1)	58 4	6)(				
	4408	+ 39 8	N	*d* +	3 4 3 86	− 58	29 8	N	*d* − 6	3 4 38 3)	− 5	3(24	6)(	6 94	000	8	
	4415	+ 39 6	N	l − 9 − 7 1	4 5 6	− 57	5 9	N	b − 3 3 − 6 (	4 6 3	− (	8 5	6)(				
	44‿0	+ 4 4	N	Q − 1 60	6 1 75	− 55	0	N	Q − 2 8	6 29 4	−2 3	7	6 9	▮ 0		+	
	4433	+ 40 45	N		8 36 48	− 55	34 93	N		8 43 98	− 4	4 84	6 9				
	4367	+ 34	S		56 33 96	− 77	3 9	S		56 4 4)	− 3	3) 8	0 6 99	6 9 1	000		64
	4387	2 46	S		3 5 6	−1 7	49)1	S		3 59 (	−2 5	56 9	7				
	4393	+ 28	S		2 29 98	− 6(	8 3	S		37 4	−2 23	35 9	6 87	▮ 0		+	
Apr 2?	4233	33 53	N	*I P W*	8 83	65	3 48	N	*I P E*	8 8 7	+ 93	(4	0 7 (	693	000	8	80
	4285	+ 39 54	N	*l* − 8	39 35	65	37 3(	N	*l* − 6	3) 4 4		44 4	7 (				
	4311	+ 38 8	N	b + 7 + 7	44 45 58	+ 65	47 23	N	b − 3 3 − 2	44 5 3	+)7	54)	7 (	▮		+	
				Q + 62					Q + 2								
	4250	+ 9 5	S		3 35	+ 64	99	S		31 28 37	+ 73	30 0	0 7 11				
	4260	+ 21 4	S		33 (98	+ 64	8 62	S		33 33 91	+ 83	35 74	7 1	1	000		34
	4267	1 3	S		35 49 9	+1 (4	51 43	S		35 56 8	+ 6	58 58	7 5				
	4277	− 0 57	S		37 46 89	+ 64	48 53	S		37 54 4	+ ((	55 7	7 7	▮		+	
	4299	+ 4	S		42 3 8	+1 64	33 45	S		42 38 78	+ 7	4 55	7				
	4360	+ 3 4	N	Q − 1 62	12 54 52 39	− 6	5 79	N	Q − 2	54 59 98	− 13	57 85	0 7 06				
	4408	+ 39 8	N		3 43 5	− 60	8 90	N		3 4 37 95	−2 5	35 9	7 00		000	8	99
	4415	+ 39 6	N		4 5 4	− 60	5 80	N		4 59 84	−2 06	57 78	6 98			0	
	4420	+ 4 4	N		6 2 34	−1 6	9 74	N		6 28 79	−2 3	26 6	7 2	▮ 0		+	
	4433	+ 4 45	N		8 36 1	−1 6	34 52	N		8 43 56	− 4	4 5	7 00				
	4367	+ 11 34	S		12 56 33 48	−1 60	31 88	S		12 56 4 5	−2 29	38 8(	0 6)8		000		84
	4387	+ 21 46	S		13 0 5 9	− 60	49 59	S		3 58 78	−2	56 58	6 99	6 9 3			
	4393	+ 28 1	S		2 29 54	−1 60	27 94	S		2 37 06	−2 17	34 89	6 95	▮			

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

DEHRA DŪN (E) Lat 30° 19′ Long 5 12 28s AND AGRA (W) Lat 27° 10′ Long 5 12m 14

Astronomical Date	Star		Transits Observed at E By St h th T l p N 2					Transits Observed at W By B rr d with Tel p N 1					Diff of Corrected Times (W − E)		Correction for Rate of W Clock	Com for Personal Equations $S_W - B_N = +0^s.87$ $S_S - B_S = +0$	$\Delta L + \rho$
	B A C Number	Decl	Star Aspect	Instrumental Constants	Mean Observed Time	Total Correction	Sidereal Corrected Time	Star Aspect	Instrumental Constants	Mean Observed Time	Total Correction	Sidereal Corrected Time	By each Star	Mean of Group			
1886					h m					h m			m				
Apr 20	4519	+ 42 41	N	*I P E*	3 26 8 4	+ 7	9 85	N	*I P E*	3 26 24 72	+ 2 4	26 86	0 7 0		0	+ 8	0 7 7
	4552	+ 36 5	N	*d* + b − − 5 *Q* + 1 6	32 22 8	+ 67	24 54	N	*d* − (b − 8 − 4 4 *Q* + 2 9	32 9 51	+ 2 6	3 57	7 3	s 0			
	4499	+ 4 24	S		3 5 58	+ 54	52 2	S		3 2 57 35	+ 84	59 9	7 7				
	4529	+ 4 4	S		28 2 75	+ 5	25	S		28 27 46	1 76	9	6 97	s 7 8			
	4559	+ 11 2	S		33 56 65	+ 1 5	58 7	S		34 3 35	+ 8	5 7	7			+	7
	4566	+ 23 5	S		35 37 97	+ 1 59	39 56	S		35 44 60	+ 9	46 5	6 96				
	4595	+ 39 4	N	*Q* − 1 60	3 4 25 8	− 1 5	23 57	N	*Q* − 2 09	3 41 32 63	− 2 0	30 53	0 6 96				
	4600	+ 39 7	N		42 7 2	− 5	5 5	N		4 4 58	−	2 48	6 97				
	4640	+ 9	N		48 2 4	− 58	0 8	N		48	− 2	7 8	6 98	s 6 988	000	+ 87	7 5
	4652	+ 3 35	N		5 9 3	− 57	7 75	N		5 6 98	− 7	14 8	7 6				
	4678	+ 3 3	N		57 3 97	− 1 56	3 4	N		57 39 56	− 2 8	37 38	6 97				
	4662	+ 5	S		13 53 2 4	− 66	48	S		3 53 9 82	− 2 34	7 48	0 7		000		0 7 36
	4672	+ 2 6	S		55 53 4	− 1 7	51 53	S		55 61 02	− 2 44	58 58	7 05	s 7		+ 0	
Apr 21	4519	+ 42 4	N	*I P W*	3 26 13 58	+ 1 66	15 24	N	*I P E*	3 26 20 38	+ 2 09	22 47	0 7 23				
	4543	+ 36 58	N	*d* 0 + 2 b − 7 − 10 5 *Q* + 1 60	3 7 46	+ 1 62	9 08	N	*d* 0 − 2 6 b − 1 8 a − 15 6 *Q* + 2 09	30 14 26	+ 2 05	6 3	7 23	s 7 63	0 000	+ 0 87	7 450
	4552	+ 36 52	N		32 18 3	+ 1 61	9 93	N		32 25 20	+ 2 06	27 26	7 33				
	4499	+ 14 24	S		3 22 46 12	+ 1 53	47 65	S		13 22 52 8	+ 1 90	54 7	0 7 06				
	4509	+ 9 39	S		24 5 42	+ 54	26 96	S		24 32 16	+ 1 93	34 09	7 3				
	4529	+ 4 14	S		28 16 27	+ 1 49	17 76	S		28 23 02	+ 1 85	24 87	7 11	s 0 7 20	0 000	+ 0 211	0 7 33
	4559	+ 11 20	S		33 52 19	+ 1 51	53 70	S		33 58 93	+ 1 87	60 80	7 10				
	4566	+ 23 5	S		35 33 48	+ 1 55	35 03	S		35 40 29	+ 1 94	42 23	7 20				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

DEHRA DŪN (F) *L t 30 19 Lo g 5 12ᵐ 23ˢ* AND AGRA (W) *Lat 27° 10′ L g 5ʰ 12ᵐ 14*

Astronomical Date	Star: B A C Number	Star: Declination	E: Aspect	E: Instrumental Parameters and Corrections	E: Mean Observed Time	E: Total Correction	E: Sum of Corrected Time	W: Aspect	W: Instrumental Parameters and Corrections	W: Mean Observed Time	W: Total Correction	W: Sum of Corrected Time	Diff of Corrected T (W − E): By each Star	Diff (W − E): Mean of Group	Correction for Rate of W Clock	Corrns for Personal Eq $S_E - B_W = + 0^s 87$	$\Delta L + \rho$
					h m					h m			m				
1886 Apr 21	4595	+ 39 4	N	*I P W*	34 20 6	− 5	9 3	N	*I P E*	13 4 28 35	−	26 24	0 7 21				
	4600	+ 39 7	N	d +	4 54	− 57	97	N	d − 2 (	4 5	−	8 3	7 6	7 8	000	+ 87	7 769
	4640	+ 9	N	l − 7 −1 5	47 57 8)	− 6	5(7	N	b − 8 − 5 6	48 5 64	−	3 44	7 7				
	4652	+ 3 3	N	Q − 6	5 4 7	− 6	3 6	N	Q − 2 9	5 54	− 6	38	7 2				
	46 8	+ 32 13	N		57 7 43	− 6	5 82	N		57 35 4	−2 17	32 97	7				
	4662	+ 5	S		3 53 7 64	− 68	5 96	S		3 53 5 4	− 27	3 4	0 7 8	5	0 000	+	7 6
	4672	+ 2 6	S		55 48 9	− 7	47 8	S		55 56 5	− 33	54 9	7 1	0			
Ap 22	4519	+ 42 4	N	*I P W*	3 (9 6	73	1 99	N	*I P W*	3 6 5 73	+ 34	8 7	0 7 8	7	000	+ 87	7 5
	4552	+ 36 5	N	d + b + 9 − 5 5	3 4	+ 70	5 7	N	d 0 + b + 8 − 9 9	32 20 5	+2 6	77	7 06				
				Q + 6					Q + 2 9								
	4499	+ 4 24	S		3 22 4 76	+ 53	43 9	S		3 2 48 34	+2 05	50 39	0 7 1				
	4509	+ 9 39	S		24 06	+1 54	2 6	S		24 7 63	+2)	9 2	7 2	7 088	000	+ 1	0 7 99
	4529	+ 4 14	S		28 97	+ 47	3 44	S		8 8 5	98	0 49	7 5				
	4559	+	S		33 47 83	+ 5	49 34	S		33 54 4	+ 4	56 44	7 1				
	4566	+ 3 5	S		35 9 7	+ 57	3 74	S		35 35 68	+ 3	37 8	7 07				
	4595	+ 39 4	N	Q − 1 60	3 4 6 23	−1 49	14 74	N	Q − 2 09	3 3 68	− 89	21 79	0 7 05				
	4600	+ 39 7	N		4 58 18	− 49	56 69	N		4 5 68	− 88	3 8	7	7 06	0 000	+ 87	7 93
	4640	+ 29 12	N		47 53 53	−1 59	5 94	N		47 6 2	−1 99	59 3	7 9	0			
	4652	+ 32 35	N		50 60 5	−1 55	58 95	N		5 8 4	−1 97	6 7	7 2				
	4678	+ 3 13	N		57 23 08	−1 56	21 52	N		57 3 57	−1 99	28 58	7 06				
	4656	+ 28 3	S		3 51 15 33	−1 59	13 74	S		13 51 22 84	−2 00	20 84	0 7 10	7 70	000	+ 0 2	0 7 8
	4662	+ 15 12	S		53 3 36	−1 67	1 69	S		53 10 84	−2 3	8 71	7 02	0			
	4672	+ 2 6	S		55 44 43	−1 74	42 69	S		55 52 00	−2 22	49 78	7 09				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

DEHRA DŪN (E) *Lat 30° 19′ Long 5h 12m 23s* AND AGRA (W) *Lat 27° 10′ Long 5h 12m 14s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, *By Strahan with Telescope No 2*: Star Aspect	Instrumental Parameters and Correction Constants	Mean Observed Time	Total Correction	Sidereal Corrected Time	Transits Observed at W, *By Burrard with Telescope No 1*: Star Aspect	Instrumental Parameters and Correction Constants	Mean Observed Time	Total Correction	Sidereal Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Correction for Personal Equation $S_W - B_W = +$, $S_E - B_E = +$	$\Delta L + \rho$
1886 Ap 23	4519	+ 42 41	N	*I P E* d + b 6 − 3 1 s Q + 6	h 3 6 5 6	+1 71	6 77	N	*I P W* d c − 4 b − 7 −3 5 s Q + 2	h 3 61 58	+2	3 79	m 0 7	s 7		7 + 0	0 7
	4499	+ 4 24	S		3 22 37 49	53	39 2	S		2 44 7	+ 71	46 6	7 4	s 7 38		+ 2	7 249
	4509	+ 19 39	S		24 16 82	+ 58	18 4	S		24 3 54	+ 86	25 4	7				
	45 9	+ 4 4	S		28 7 63	+ 5	9 3	S		28 4 49	+ 68	6 7	7 04				
	4559	+ 11 20	S		33 43 53	+ 54	45 7	S		33 5 35	+ 77	52 2	7 5				
	4566	+ 23 5	S		35 24 87	+ 58	6 45	S		35 3 6	+1 9	33 5	7 06				
	4595	+ 39 4	N	Q − 1 6	3 41 1 8	− 53	0 55	N	Q − 2 10	3 41 9 58	−2 7	17 5	0 6 96	s 7 000	00	+ 8	7 8
	4600	+ 39 7	N		4 54	− 53	52 48	N		4 61 8	− 08	59 5					
	4640	+ 9	N		47 49 37	− 59	47 78	N		47 56 98	−	54 76	6 98				
	4652	+ 32 35	N		50 56 4	− 5	54 67	N		5 3 86	− 5	71	7 4				
	4678	+ 32 3	N		57 8 88	−1 58	7 3	N		57 26 47	−2 7	24 30	7 00				
	4656	+ 28 3	S		3 5 1 2	− 59	9 53	S		3 5 8 75	−2 4	6 51	0 6 98	s 7 003	000	+	7 4
	4662	+ 5	S		5 59 08	− 68	57 4	S		53 6 8	− 4	4 4	7				
	4672	+ 2 6	S		55 40 23	− 73	38 5	S		55 48 4	−2 52	45 52	7 02				
Ap 24	4519	+ 4 4	N	*I P E* d c + 0 b − 9 a − 9 3 Q + 1 60	3 26 0 85	+ 68	2 53	N	*I P E* d − 2 6 b − 3 3 a − 17 8 Q + 2 05	13 26 7 54	+2 02	9 56	0 7 03	s 7 087	000	+ 0 87	7 74
	4543	+ 36 58	N		9 54 73	+ 60	56 33	N		30 1 44	+2 00	3 44	7 1				
	4552	+ 36 52	N		32 5 60	+ 62	7 2	N		32 12 37	+ 97	14 34	7 12				
	4499	+ 14 24	S		3 22 33 35	+1 43	34 78	S		13 22 40 07	+1 83	41 90	0 7 12	s 0 7 090	0 000	+ 0 211	0 7 3
	4509	+ 19 39	S		24 12 65	+ 49	14 14	S		24 19 34	+ 85	21 9	7 5				
	4529	+ 4 4	S		28 3 51	+ 37	4 88	S		28 0 22	+1 6	11 98	7				
	4559	+ 11 20	S		33 39 41	+1 41	40 82	S		33 46 10	+ 80	47 90	7 08				
	4566	+ 23 5	S		35 20 73	+ 50	22 23	S		35 27 45	+1 88	29 33	7 0				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

DEHRA DŪN (E) *Lat 30° 19′ Lo g 5h 12 23s* AND AGRA (W) *Lat 27° 10′ Lo g 5 12m 1s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan, with Telescope No 2: Star Aspect	Instrumental Position and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Barrard with Telescope No 1: Star Aspect	Instrumental Position and Corrections	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Time (W − E): By each Star	Mean of Group	Correctn for Rate of W Clock	Corrns. for Persl Equat $S_E - B_W = + 0^s 87$, $S_S - B = + 0$	$\Delta L + \rho$
1886					*h m*					*h m*			*m*				
Apr 24	4595	+ 39 4	N	*I P E*	3 41 7 84	− 58	6 6	N	*I P E*	3 4 15 45	−2 1	3 35	7 09				
	4600	+ 39 7	N	*d* +	4 49 8	− 55	48 3	N	*d* − 2 6	4 5 38	−2	55 27	7 4	∞	000	87	0 7 245
	4640	+ 9 2	N	b − 9 − 9 3	47 45 3	− 66	43 47	N	b − 3 3 − 7 8	47 52 73	−2 20	50 53	7 06				
	4652	+ 3 35	N		5 52 8	− 6	50 46	N		50 59 66	−2 6	57 50	7 04	8 0		+	
	4678	+ 32 13	N	Q − 1 60	57 4 69	− 63	3 6	N	Q − 2 05	57 22 29	− 17	12	7 06				
	4662	+ 5 12	S		3 52 54 93	− 6	53 7	S		3 53 47	−2 28	9	0 7 02	080	000		0 7 9
	46 2	+ 2 6	S		55 36	− 84	34 7	S		55 43 67	−2 36	4 31	7 14	8		+	
Apr 25	4519	+ 4 4	N	*I P W*	3 25 56 39	+1 65	58 4	N	*I P E*	3 6 3 24	+ 00	5 24	0 7 20	7	000	∞	4 4
	4543	36 8	N	*d* − 0 8	29 50 3	+ 65	5 95	N	*d* − 2 6	29 57 25	+ 96	59 21	7 26	7			
	4552	+ 36 5	N	b + 7 + 1 2	32 1 8	+ 65	2 83	N	b − 3 3 −2 4	32 8 09	+ 93	2	7 19	8 0		+	
				Q + 1 63					Q + 99								
	4499	14 24	S		3 22 28 78	+1 65	3 43	S		13 22 35 81	+1 75	37 56	0 7 13				
	4509	+ 19 39	S		24 8 09	+ 65	9 74	S		24 15 09	+1 76	16 85	7 1	44	000		7 355
	4529	4 4	S		27 58 87	+ 65	60 52	S		28 6 04	+ 67	7 7	7 9				
	4559	+ 1	S		33 34 8	+ 65	36 47	S		33 4 87	+ 7	43 9	7 2	8		+	
	4566	+ 23 5	S		35 16 19	+1 65	7 84	S		35 23 2	+ 8	25 01	7 17				
	4595	+ 39 4	N	Q − 1s 63	13 41 3 50	−1 61	1 89	N	Q − 1s 99	3 4 2	−2 03	8 99	0 7				
	4600	+ 39 7	N		41 45 40	− 6	43 79	N		4 52 96	−2 03	5 93	7 4	8	000	87	7 3 5
	4640	+ 29 12	N		47 40 77	−1 61	39 16	N		47 48 38	−2 13	46 25	7 09	7			
	4652	+ 32 35	N		50 47 67	−1 61	46 06	N		5 55 32	−2 09	53 23	7 7	8 0		+	
	4678	+ 32 3	N		57 0 3	−1 6	8 70	N		57 7 89	−2 10	15 79	7 09				
	4656	+ 28 3	S		3 51 2 51	−1 61	0 90	S		3 5 10 13	−2 12	8 01	0 7 1	77	000		88
	4662	+ 15 2	S		52 50 48	−1 6	48 87	S		52 58 3	−2 24	55 89	7 02				
	4672	+ 2 6	S		55 31 52	−1 61	29 9	S		55 39 33	−2 3	37	7 1	8		+	

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

EXPERIMENIAL ARO AT DEHRA DŪN

Astronomical Date	Star: B A C Numbe	Star: D l n t n	Transits Observed at E (By St h w th T lsso p N 2): St A pect	In t me tal P t a d C rr tio C ta ts	M n Obs rv d Time	T t l Corr t o	S co d f C rr t ed T m	Transits Observed at W (By B d with T l op No 1): Star A pect	I strum tal P t d Corr t n C t ts	M an Ob rvpd T m	T tal Corr t	Sec nd f Co r ct d Time	Diff f C cted Times (W − E): By ach St	Mea f G p	C rrect f Rat of E Clock	Corrn for P rsl Equat ns $S_N - B_N = + 77$ $S_S - B_S = + 0 7$	$\Delta L - \rho$
1886					h m					h m			m				
May 5	4233	+ 33 53	N	I P W	7 59 9	63	60 72	N	I P W	2 27 57 94	+ 2 56	6 5	−0 0 22	75	000	77	098
	4258	+ 4 30	N	d +	33 4 5	+ 1 67	5 82	N	d − 0 3	33 13 4	+ 2 53	15 57	0 25				
	4285	+ 3) 54	N	b + 2 − 6 6	39 32 88	+ 66	34 54	N	b + 3 3 a + 8	39 3 66	55	34	33	m		+	−
	4311	+ 38 8	N	Q + 1 (2	44 4 75	+ 65	44 4	N	Q + 2 49	44 4 56	+ 54	44	3	−			
	4223	+ 25	S		12 25 6 3	+ 1 61	7 4	S		2 5 4 9	+ 2 59	7 49	− 25				
	4250	+ 9 5	S		3 8 63	+ 57		S		3 7 9	+ 63	9 9	28	98	0 000	7	7
	4267	+ 3	S		35 47 8	+ 1 57	48 65	S		35 45 69	+ 2 63	48 3	0 33	m			
	4277	− 0 57	S		37 44 23	+ 1 54	45 7	S		37 42 82	+ 2 65	45 47	0 3	−		+	−
	4299	+ 14	S		42 29 10	+ 1 57	3 67	S		42 27 7	+ 2 63	3 34	33				
	4346	+ 38 5(	N	Q − 1 62	2 50 42 11	− 1 60	40 51	N	Q − 2 49	50 4 10	+ 0 05	40 5	−0 36				
	4408	39 8	N		13 4 27 66	− 59	26 7	N		13 4 28 5	− 2 44	5 8	0 6	3 8	000	77	5
	4415	+ 39 6	N		4 49 59	− 58	48 0	N		4 50 8	− 2 42	47 66	35	m			
	4420	4 4	N		6 8 57	− 1 58	6 99	N		6 19 7	− 2 43	6 64	0 35	−		+	−
	4433	+ 4 45	N		8 3 25	− 1 59	31 66	N		8 33 79	− 2 45	31 34	0 32				
	4351	+ 8	S		2 53 7 7	− 1 65	16 07	S		53 15 59	+ 1	5 7	−0 0 37	3 0	0 000	27	43
	4393	+ 28 0	S		13 2 26 7	− 1 63	25 9	S		3 2 27 12	− 2 40	24 72	0 37	m 0 −		+	− 0 0
May 6	4233	+ 33 53	N	I P E	2 27 58 9	+ 1 70	60 61	N	I P W	2 27 56 97	+ 3 13	60 10	−0 0 51	453	000	77	276
	4258	+ 4 3	N	d c + 3	33 4 06	+ 1 68	5 74	N	d − 0 3	33 2 12	3 13	15 25	0 49				
	4285	+ 39 54	N	b + 5 a + 3 6	39 32 68	+ 1 68	34 36	N	b + 2 5 + 6	39 3 82	+ 3 13	33 95	0 41	m		+	− 0
	4311	+ 38 8	N	* Q + 1 63	44 42 58	+ 1 68	44 26	N	Q + 3 1	44 40 71	+ 3 15	43 86	0 40	−			
	4209	+ 24 44	S		12 23 4 74	+ 1 70	43 44	S		12 23 39 88	+ 3 7	43 05	−0 0 39				
	4223	+ 25	S		25 15 9	+ 1 70	17 6	S		25 7 09	+ 0 09	17 18	0 43				
	4250	+ 9 25	S		31 8 38	+ 1 70	20 08	S		31 26 46	+ 3 23	19 69	0 39	− 0 418	0 000	+ 0 227	− 0 0 191
	4267	+ 11 3	S		35 46 78	+ 1 70	48 48	S		35 44 83	+ 3 2	48 03	0 45				
	42 7	− 0 57	S		37 43 92	+ 7	45 62	S		37 41 96	+ 3 23	45 19	0 43				
	4299	+ 4 1	S		42 28 85	+ 1 0	30 55	S		42 26 92	+ 3 21	30 13	0 42				

* Owing to th irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off and consequently in these cases Q = 0 00.

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

EXPERIMENTAL ARC AT DEHRA DŪN

Astronomical Date	Star: B A C Number	Star: Declination	E: Star Aspect	E: Instrumental Pen Equation and Corrections	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	W: Star Aspect	W: Instrumental Pen Equation and Corrections	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Difference (W − E): Mean of Group	Correction for Rate of E Clock	Corrns for Personal Equation $S_N - B_N = +$, $S_S - B_S = +$	$\Delta L - \rho$
1886					/					h m			m				
May 6	4346	+ 38 56	N	*I P E*	12 50 41 89	−1 57	4 32	N	*I P W*	2 5 43 06	−3 05	4 0	−0 0 3	− 33	000	+ 7	− 5
	4360	+ 3 24	N	d + 0 3	54 49 4	− 6	47 8	N	d − 3	54 5 53	−3 5	47 48	33				
	4408	+ 39 8	N	b + 2 5 + 3 6	3 4 7 53	− 57	5 96	N	b + 5 + 6	3 4 28 65	−3 05	25 60	0 3(				
	4415	+ 39 6	N	Q − 1 63	4 49 4	− 59	47 83	N	Q −3 0	4 5 57	−3 06	47 5	3				
	4420	+ 4 24	N		6 8 39	− 59	6 8	N		6 9 48	−3 7	6 4	0 3)				
	4433	+ 4 45	N		8 33	− 59	3 51	N		8 34 3	−3 7	3 23	0 8				
	4351	+ 8	S		2 53 7 46	− 57	5 89	S		53 8 6	−2 9)	5 6	−0 0 27	−0 330	0 000	+ 7	− 3
	4373	− 3 3	S		58 5	− 57	94	S		58 3 54	−2 95	59	35				
	4387	+ 2 46	S		3 48 5	− 57	46 58	S		3 0 49 3	−3	46	0 36				
	4393	+ 28 0	S		2 26 5	− 58	4 92	S		2 27 61	−3 3	4 58	0 34				
M y 7	4233	+ 33 53	N	*I P E*	7 59 4	+1 6	6 65	N	*I P E*	7 57	+3 30	60 3	−0 0 34	−0 0 3	000	+ 0 7	− 73
	4258	+ 4 30	N	d 3	33 4 8	+1 6	5 8	N	d + 3 7	33 2 4	+3 35	5 39	0 4				
	4285	+ 39 54	N	h − 4 − 3 8	39 32 8	+ 6	34 44	N	b + 3 − 3 8	39 30 77	+3 35	34 2	0 32				
	4311	+ 38 8	N	Q + 1 60	44 42 73	+ 6	44 34	N	Q + 3	44 4 67	+3 34	44	33				
	4209	+ 24 44	S		23 4 9	+ 59	43 49	S		2 23 39 95	+3 22	43 17	−0 0 3	−0 358	000	+ 0 27	− 3
	4223	+ 25 2	S		25 6 06	+ 59	17 65	S		25 4 7	+3 2	7 29	0 36				
	4250	+ 9	S		3 18 55	+1 57	2	S		3 6 6	+3 3	9 75	0 3				
	4267	+ 1 3	S		35 46 97	+1 57	48 54	S		35 48 3	+0 5	48 8	0 36				
	4 77	− 0 57	S		37 44 12	+ 56	45 68	S		37 42	+3 09	45 29	39				
	4299	+ 14 11	S		42 29 00	+1 58	30 58	S		42 27 06	+3 17	30 23	0 35				
	4346	+ 38 56	N	Q − 60	12 50 42 04	−1 58	40 46	N	Q − 3 10	12 50 43 05	−2 87	40 18	− 28	−0 0 92	0 000	+ 77	− 5
	4360	+ 31 24	N		54 49 5	−1 60	47 92	N		54 50 60	−2 91	47 69	0 23				
	4408	+ 39 8	N		3 4 27 66	−1 58	26 08	N		13 4 28 64	−2 86	25 78	0 30				
	4415	+ 39 6	N		4 49 54	−1 58	47 96	N		4 50 50	−2 85	47 65	0 3				
	4420	+ 41 24	N		6 18 56	−1 58	16 98	N		6 19 45	−2 85	6 60	0 38				
	4433	+ 40 45	N		8 33 22	−1 58	31 64	N		8 34 23	− 84	3 39	25				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off and consequently in these cases Q = 0 00.

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

EXPERIMENTAL ARC AT DEHRA DŪN

Astronomical Date	Star: B A C Number	Star: Decl t	Transits Observed at E, By St han w th Teles op N 2: Star Aspect	Instrumental Posit and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By B rr rd w th T les op N 1: Star Aspect	Instrumental Posit and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Time (W − E): By each Star	Mean of Group	Correction f Rate of E Clock	Corrns f Personal Equation $S_W - B_E = +0^s 77$, $S_E - B_W = +0\ 7$	$\Delta L - \rho$
1880					*h m*					*h m*			*m*				
M y 7	4351	+ 18	S	*I P E*	2 53 7 6	− 6	15 99	S	*I P E*	12 53 8 75	−3	5 74	−0 0 25	− 85	000	+ 0 7	− 8
	4373	− 3 3	S	*d* c + 0 3	58 2 64	−1 65	0 99	S	*d* + 3 7	58 3 84	−3	73	6				
	4387	+ 21 46	S	b − 4 − 3 8	13 48 33	− 6	46 7	S	b + 2 3 − 3 8	3 49 38	− 99	46 39	33				
	4393	+ 28	S	Q − 1 60	2 26 64	− 6	25 4	S	Q − 3 1	2 7 67	− 93	4 74	0 3				
May 8	4233	+ 33 53	N	*I P W*	12 27 58 59	1 63	6 22	N	*I P E*	2 27 56 75	+3 3	60 5	−0 0 7	− 0	000	+ 0 77	+ 0 0 007
	4258	+ 4 3	N	*d* c + 0	33 3 68	+ 67	5 35	N	*d* + 3 7	33 82	+3 3	5 2	0 3				
	4285	+ 39 54	N	b − 7 − 7 7	39 32 32	+ 66	33 98	N	b + 3 + 2 2	39 30 5	+3 30	33 8	0 6				
	4311	+ 38 8	N	Q + 1 64	44 4 0	+1 65	43 85	N	Q + 3 0	44 4 42	+3 3	43 73	0 12				
	4209	+ 24 44	S		2 23 41 52	+ 60	43 2	S		2 3 39 67	+3 28	42 95	− 0 7	− 0 0 38	00	+ 0 0 7	− 0 0
	4223	+ 25 2	S		25 15 7	+1 6	7 3	S		25 3 77	+3 29	7 06	24				
	4250	+ 9 25	S		3 18 8	+ 57	9 75	S		3 6 8	+3 28	9 46	0 29				
	4267	+ 11 3			35 46 53	56	48 9	S		35 44 58	+3 28	47 86	0 23				
	4277	− 0 57	S		37 43 72	+ 54	45 26	S		37 4 7	+3 9	44 99	27				
	4299	+ 14 11	S		42 28 58	+1 57	30 15	S		42 26 62	+3 3	29 92	0 23				
	4346	+ 38 56	N	Q − ^{s} 64	2 50 4 58	−1 63	39 95	N	Q − 3^s	12 50 4 8	−2 88	39 92	−0 0 03	− 0 093	0 000	+ 0 77	+ 0 0 085
	4360	+ 31 24	N		54 49 09	−1 66	47 43	N		54 50 32	−2 92	47 40	0 03				
	4408	+ 39 8	N		3 4 27 2	−1 63	25 58	N		13 4 28 35	−2 88	25 47	0 11				
	4415	+ 39 6	N		4 49 8	− 63	47 45	N		4 5 23	−2 89	47 34	0				
	4420	+ 4 4	N		6 18 09	−1 6	6 47	N		6 19 22	−2 90	16 32	0 15				
	4433	+ 40 45	N		8 32 74	−1 62	31 12	N		8 33 90	−2 90	31 00	0 12				
	4351	+ 8	S		2 53 17 24	− 70	5 54	S		2 53 18 34	−2 90	15 44	−0 0 10	− 0 0 38	000	+ 0 7	+ 0 089
	4373	− 3 3	S		58 2 36	−1 75	0 61	S		58 3 35	−2 90	0 45	0 16				
	4387	+ 21 46	S		13 0 47 94	− 69	46 25	S		3 0 49 01	−2 91	46	0 15				
	4393	+ 28 1	S		2 26 24	−1 67	24 57	S		2 27 34	−2 91	24 43	0 14				

OF THE A1PARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

EXPERIMENTAL ARC AT DEHRA DŪN																	
Astron mical Dat	STAR		TRANSITS OBSERVED AT E *By St ha w th T l sc p No 2*					TRANSITS OBSERVED AT W *By B rrard w th T l p N 1*					D ff c of Corrected 1 mes (W − F)		Correction f Rate f W Clock	Corrns f P rsl Eq at ns $S_N - B_N = + \cdot 7$ $S_S - B_S = + \cdot 7$	$\Delta L + \rho$
	B A C N mb	De l n ti n	St A pe t	In t mental P t d C rr t n C ta t	M an Ob d Time	T tal C re tion	S o d f C rr ict ed T m	Sta A pect	I t um tal I os t l C t C n ta t	M a Ob rv d T me	T t l C t	S d f C t d I	By a h Star	M an of G p			
1886					h m					h m			m				
M y 5	4457	35 44	N	*I P W*	3 3 46 99	+ 64	48 63	N	*I P W*	3 13 45 6	+2 56	48 32	−0 0 3				
	44 9	+ 37 38	N	d + b + − 6 6	8 4 0	+ 64	4 74	N	d − 3 b + 3 3 + 8	8 39 9	+ 55	4 46	8	64	000	7	087
	4519	+ 4 4	N		6 6 5	+ 66	7 9	N		26 5	+2 55	7 65	26				
	4543	+ 36 58	N	Q + 1 62	3	+ 64	75	N	Q + 2 49	3 8 95	+2 55	5	0 25			+	
	4552	+ 36 52	N		32 00	+1 65	65	N		3 9 86	57	43					
	4470	+ 4	S		3 5 5 4	+ 56	5 56	S		3 5 49 94	+ 64	5 58	− 0 38				
	4496	− 0 14	S		3 73	54	5 27	S		22 2 26	+2 65	24 91	36	0 44	000	27	7
	4509	+ 9 39	S		24 27 98	+ 59	9 57	S		24 6 63	+2 6	3	34				0
	4529	+ 4 14	S		8 8 83	+ 56	39	S		28 17 42	+2 64	0 6	0 33			+	
	4562	+ 20 32	S		35 1	+ 5	12 71	S		35 9 8	+2 6	2 4	31				
	4592	+ 31 8	N	Q − 62	3 41 6 57	−1 62	4 95	N	Q − 2 49	3 4 7 6	−2 40	4 66	− 0 2				
	4606	+ 3 58	N		43 2 46	−1 6	0 85	N		43 2 93	−2 4	10 52	33	263	000	7	086
	4628	+ 35 4	N		46 7 34	− 6	6 34	N		46 8 47	−2 43	6 4	3				
	4652	+ 3 35	N		51 7 58	− 6	5 7	N		5 8	−2 4	5 72	5			+	
	4678	+ 32 13	N		57 3	−	8 6	N		57 3	− 4	8 35	5				
	4699	+ 44 24	N		4 3 22 85	− 57	2 28	N		4 3 23 55	−2 43	21 2	0 6				
	4640	+ 29 2	S		3 47 60 6	− 61	59 00	S		3 47 6 8	− 3	58 69	− 3		000	227	08
	4672	+ 2 6	S		55 51 5	− 69	4 8	S		55 5 8	−2 34	4 47	34				0
	4688	− 8 21	S		4 6 58	− 7	4 86	S		4 6 83	−2 3	4 53	0 33			+	
		—															
May 6	4457	+ 35 44	N	*I P E*	3 3 46 8	+ 68	48 46	N	*I P W*	3 3 48 7	+0 6	48 3	− 33	363	0 000	7	98
	4479	+ 37 38	N	d 0 + 3 b + 2 5 a + 3 6	8 4 98	+ 6	4 65	N	d − 0 3 b + 5 + 6	8 42 23	+0 06	4 29	36				
	4519	+ 42 41	N		26 16 12	+ 67	7 79	N		26 14 8	+3 14	1 42	0 37	0		+	
	4552	+ 36 5	N	* Q + 1 63	32 0 92	1 68	2 60	N	Q + 3 0	32 9 06	+3 5		39				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off and consequently in these cases Q = 0 00.

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

Astronomical Date	Star: B A C No	Star: Decl	Transits Observed at E (By St… with T… p N 2): Star Aspect	Instrumental Position Correction and Constant	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By B… d with T… p N 1): Star Aspect	Instrumental Correction and Constant	Mean Observed Time	Total Correction	Seconds of Corrected Time	Diff of Corrected Time (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Correction for Personal Equation	$\Delta L + \rho$
1886					h m					h m							
M y (	4470	+ 24	S	I P E	3 55 4	+ 1 7	52 84	S	I P W	3 5 52 35	+ 3	5 48	− 0 36	393	000	7	66
	4 09	+)39	S	d	4 7 77	+ 69	29 46	S	d	24 25 8)	+ 3	29 (	4	m		+	− 0
	4. J	+ 4 14	S	+ 3 / + 5 / + 3 6	28 8 57	+	2 27	S	c − 3 / b + 5 / + 6	28 6 68	3	9 9	3	1			
	4 62	+ 20 32	S	Q + 1 63	35 1	+ 69	7	S	Q + 3	35 9 7	+ 3 9	6	44				
	459	+ 31 28	N	Q − 1 63	34 (4	− 1 9	4 83	N	Q − 3	34 4 45	+ 7	4 5	− 0 3	7	00	7	33
	4606	+ 31 58	N		43 12 38	− 59	1 9	N		43 3 47	− 3 3	44	0 35	m		+	−
	46 8	+ 35 4	N		4(7 84	− 58	(26	N		46 8 9)	− 3 4	5 95	3	1			
	4652	32 35	N		5 5	− 5)	5 9	N		51 8 66	− 3 4	5 6	)				
	4678	+ 3 3	N		57 3 3	− 59	8 54	N		57 8 1	+ 6	8 7	7				
	4699	+ 44 24	N		4 3 2 84	− 1 59	2 5	N		4 3 20 8)	+ 3	9	33				
	4640	+ 9	S		3 47 (48	− 58	58 9	S		3 47 (6	− 3 3	58 5)	− 3	345	0 000	+ 0 27	8
	46(	+ 5 2	S		53 6	− 57	8 (9	S		53 8 9	+ 1	8 3	39	m			−
	46 2	+ (	S		55 5	− 55	49 75	S		55 49 26	+ 3	49 39	0 36	1			
	4688	− 8	S		4 6 4	− 5	14 84	S		4 4 35	+ 7	14 52	32				
M y 7	44 7	+ 35 44	N	I P E	3 3 46 95	+ 63	48 58	N	I P E	3 3 44 95	+ 3 32	48 7	− 3	3 6	000	+ 0 77	− 0 49
	44 9	+ 37 38	N	d	8 41 9	+ 1 63	42 7	N	d	8 39 00	+ 3 35	42 35	0 37	m 0			
	451)	+ 42 4	N	+ 0 3 / b − 4 / − 3 8	2(16	+ 1 64	7 91	N	+ 3 / b + 3 / − 3 8	26 4 22	+ 3 38	7 60	0 3	1			
	4543	+ 36 58	N	Q + 1 62	3 6	+ 63	11 79	N	Q + 3 0	3 8 4	3 33	47	0 3				
	45 2	+ 36 5	N		32 4	63	22 67	N		32 9	+ 3 3	22 35	32				
	4470	+ 24	S		3 55 33	+ 1 58	5 9	S		3 15 49 38	+ 3 2	52 50	− 0 0 4	4 4	000	+ 0 227	− 0 77
	4496	− 4	S		22 3	58	25 29	S		2 77	+ 3 1	4 88	0 4	m			
	4509	+ 9 39	S		4 7 96	+ 1 6	9 56	S		24 26 00	+ 3 19	29 19	0 37	1			
	4529	+ 4 4	S		8 18 82	+ 58	4	S		8 16 83	+ 3 13	19 96	0 44				
	4562	+ 0 32	S		35 4	+ 1 60	2 74	S		35 9 5	+ 3 20	2 35	0 39				

Table title band: EXPERIMENTAL ARC AT DEHRA DŪN. Column heading for Correction for Personal Equation: $S_N - B_N = +0\ 7$, $S_S - B_S = +\ 7$.

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00

OF THE APPARENT DIFFERENCE OF LONGITUDES ΔL + ρ

EXPERIMENTAL ARC AT DEHRA DŪN

Astronomical Dates	Star: B A C Number	Star: Declination	Transits Observed at E: Aspect	Instrumental Parameters and Constants	Mean Observed Time	Total Correction	Sidereal Time of Culmination	Transits Observed at W: Aspect	Instrumental Parameters and Constants	Mean Observed Time	Total Correction	Sidereal Time of Culmination	Diff (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrections for Personal Equation	ΔL + ρ
1886					h m	s				h							
May 7	4592	+ 3 8	N	I P E	34 6 54	− (2	4)2	N	I P E	34 7 (2	−2 9	4 72	−0 2				
	4606	+ 3 58	N	d + 3	43 4	− (	8	N	l + 3 7	43 3 47	− 9	5(	2	04	000	7	7
	4622	+ 3 35	N	b − 4 − 3 8	5 7 64	− (	(	N	b + 3 − 3 8	5 8 (7	−2 89	5 8	0 24	0		0	0
	4678	+ 3 3	N		57 3 3	− 6	28 6	N		57 3 34	−2 9	28 44	0 17	±1		+	1
	4699	+ 44 4	N	Q − 6	4 32 94	− 6	2 34	N	Q − 3 10	4 3 23 95	− 8	5	9				
	4640	+ 9 2	S		3 47 60 6	− 62	58 99	S		3 47 6 68	−)3	58 75	−0 4		000	27	8
	4660	+ 5	S		53 0 34	− (4	8	S		53 11 47	−3 03	8 44	0 2(			0	
	4672	+ 2 6	S		55 5 4	− (6	49 74	S		55 52 (	−3)	4) 5	3	±1		+	1
	4688	− 8 2	S		4 6 5	− 67	4 85	S		4 7 7	−3	4 56	)				
May 8	4457	+ 3 44	N	I P W	3 3 46 4	+ 66	48 6	N	I P E	3 13 44 67	+3 3	47 97	−0 0 09		000	7	
	44 9	+ 37 38	N	d + 1	18 4 53	+ 67	4 20	N	d + 3 7	8 38 8	+3 30	42 8					
	4519	+ 42 4	N	b − 0 7 − 7 7	2(5 7	+ 6)	7 4	N	b + 3 +	(3 98	+3 3	7 9		0 ±1		+	+
	45 2	+ 3(52	N	Q + 6(	32 5	+ 66	7	N	Q + 3 1	32 8 7	+3 3	7	0				
	4470	+ 24	S		3 5 50 9	+ 57	52 48	S		3 5 48)(	3 8	5 24	−0 4		000		
	4496	− 4	S		2 23 8	+ 56	4 84	S		2 3	+3 9	24 6	0 4				0
	4509	+ 9 39	S		4 27 49	+ 6	9	S		4 25 ((	+3 9	8 95	0 5	±1		+	+
	4.29	+ 4 4	S		28 8 36	+ 57	9 93	S		8 6 44	+3 8	9 72	0				
	4592	+ 3 28	N	Q − 1 66	34 6 9	−1 68	4 4	N	Q − 3	34 7 2(	− 89	4 37	−0 0 4				
	4606	±3 58	N		43 2 00	−1 67	1 33	N		43 3 4	−2 89	0 25	0 8				
	4628	+ 35 4	N		46 7 45	−1 6(	5 79	N		4(8 (3	− 89	5 74	5	04	0 000	1 7	0 37
	4652	+ 32 35	N		51 7 5	−1 67	5 48	N		5 8 34	−2 89	5 45	3	±0 1		+	+
	4678	+ 32 3	N		57 29 74	−1 67	8 07	N		57 3 95	−2 89	8 06					
	4699	+ 44 4	N		4 3 22 45	− 62	2 83	N		4 3 23 69	−2 89	2 8	0 3				
	4640	+ 29 12	S		3 47 60 7	−1 68	58 49	S		3 47 6 33	−2 9	58 4	− 7	000	0 000	2	7
	4662	+ 15 12	S		53 9 98	−1 73	8 25	S		53 11 08	− 9	8 8	0 07			0	
	4672	+ 2 6	S		55 5 08	−1 75	49 33	S		55 52	−2 9	49 2	13	±0 1		+	+

Arc	Approximate Difference of Longitude	Intervals between Nights of Observations	Rate Corrections for both Clocks Deduced from Transits Observed at both Stations viz Corrections for the Interval between Nights of Observation and β Hourly Corrections for Nights of Observations Interpolated by means of the Quantities a.								
			at E Station for		at W Station for		Astronomical Dates of Observation	β for		Corrections to Observed Difference of Time of Transit for	
			E Clock	W Clock	E Clock	W Clock		E Clock	W Clock	E Clock	W Clock
Agra (E) and Mooltan (W)	26° 8	1885 November 23 to 24	+ 33	− 6 47	+ 1	− 6 37	1885 November 23	+ 5	− 2(8	+ 0	− 7
		24 25	+ 3	− 5 98	+ 1 5	− 6 7	24	+ 5	− 259	+	− 3
		25 26	+ 1 36	− 6 23	+ 1 8	− 6 3	25	+ 50	− 256	+	− 3
		26 27	+ 0 86	− 6 13	+ 1 2	− 6 6	26	+ 047	− 2 8	+ 020	− 3
		27 28	+ 0 29	− 6 27	− 0 04	− 6 22	27	+ 0 5	− 257	+ 011	− 112
							28	+ 005	− 26	+ 0 2	− 113
Deesa (E) and Mooltan (W)	59	December 7 to 8	− 0 13	+ 36	− 0 21	+ 0 31	December 7	− 0 007	+ 0 4	0 00	+ 001
		8 9	− 0 4	+ 0 25	− 0 30	+ 0 35	8	− 0 1	+ 3	− 001	+ 001
		9 11	− 1 34	+ 0 42	− 1 22	+ 29	9	− 02	+	− 001	000
		„ 11 12	− 0 98	+ 7	− 98	+ 0 9	10	− 3	+ 0 8	− 0	000
		12 13	− 1 06	+ 26	− 96	+ 0	11	− 3	+ 007	− 001	000
							12	− 041	+ 009	− 002	000
							13	− 042	+ 0	− 002	000
Agra (E) and Amritsar (W)	35	December 21 to 22	−	+ 2 30	− 0 06	+ 2 37	December 21	− 0 00	+ 97	000	+ 0 0 0
		22 23	+ 0 70	+ 2 46	+ 0 7	+ 2 3	22	+ 4	+ 0)8	+ 3	+ 021
		23 24	+ 1 6	+ 2 40	+ 6	+ 6	23	+ 04	+ 102	+ 008	+ 021
		24 26	+ 2 96	+ 5 17	+ 3 00	+ 5 12	24	+ 056	+ 1 6	+ 2	+ 022
		26 27	+ 2 17	+ 2 56	+ 1 97	+ 2 33	25	+ 06	+ 7	+ 013	+ 23
		27 28	+ 1 85	+ 2 55	+ 1 95	+ 2 69	26	+ 4	+ 4	+ 0 6	+ 022
		28 29	+ 2 9	+ 2 50	+ 2 6	+ 2 54	27	+ 083	+ 06	+ 0 8	+ 022
							28	+ 085	+ 1 7	+ 0 8	+ 23
							29	+ 98	+ 105	+ 20	+ 022
Amritsar (E) and Mooltan (W)	13° 44	1886 January 5 to 6	+ 6 45	− 1 72	+ 6 3	− 1 70	1886 January 5	+ 0 66	− 0 07	+ 0 061	− 0 016
		6 9	+ 10 23	− 3 74	+ 10 55	− 3 49	6	+ 205	− 061	+ 047	− 014
		9 10	+ 2 48	− 1 3	+ 2 6	− 1 33	9	+ 22	− 05	+ 028	− 012
		10 12	+ 4 23	− 4 09	+ 4 28	− 4 13	„ 10	+ 094	− 068	+ 2	− 016
		12 „ 14	+ 4 25	− 5 53	+ 4 24	− 5 52	„ 12	+ 088	− 100	+ 030	− 023
		14 19	+ 10 75	− 12 00	+ 10 8	− 11 96	14	+ 089	− 108	+	− 025
							19	+ 090	− 100	+ 021	− 023

Arc	Approximate Diff rence of Longitud	Int rvals between N ghts of Observations	Rate Co ect f both Clock D d ed fro ı Tra sit Ob rved t both Stat ns ... C rre t ns f th I tervals betwee N ghts of Ob rvat a d β Hourly Correct ons for N ght of Obs t I t rpol t d by mean f th Q t t								
			at E Stat on for		t W Stat o for		Astronomi l D t f Ob e t	β for		Co rect o to Obs rved Diff n f T mes f Tra t f	
			E Cl k	W Cl k	E Cl ck	W Clo k		E Cl k	W Clock	E Clock	W Clock
		1886	s				188(				s
Moolt n (E) and Karach (W)	7^m 42	J ua y 27 to 28	+ 4 96	− ı 3	+ 5 01	− 1 22	Ja uary 27	+ 208	− 0 53	+ 61	− 0 0 6
		28 29	+ 5 01	− ı 28	+ 5 09	− 1 19	28	+ 209	− 052	+ 062	− 015
		29 31	+ 9 79		+ 9 77		29	+ 207	− 52	+ 0(	− 15
		Ja 31 to F b 2	+ 0 5	+ 4	+ 1	+ 3	31	+ 7	+ 4	+ 061	+ 0 7
		Februa y 2 to 8	+ 5 46	+ 93	+ 5 35	+ 84	F bruary 2	+ 8	+ 3	+ 64	+ 009
							8	+ 225	+ 37	+ 0((	+ 01
P haw (E) nd M ltan (W)	0 26	February 9 to 10	+ 67	− 46	+ 7	− 36	F bruary 9	+ 7	− 017	+ 001	0 000
		10 11	+ 1 38	+ 0 86	+ 30	+ 0 8	10	+ 063	+ 9	000	00
		11 12	+ 57	+ 87	+ 0 50	+ 0 89	11	+ 039	+ 035	000	000
		12 17	+ 3 76	+ 3 88	+ 4 3	+ 4 0	12	+ 7	+ 35	000	000
		17 18	+ 1 4	+ 24	+ 3	+ 03	17	+ 043	+ 040	000	000
							18	+ 53	+ 047	000	00
Amrit ar (E) and Pesh war (W)	3 8	F b 24 to M 4	+ 88 53	− 51	+ 88 74	− 3	F b uary 24	+ 46	− 007	+ 0 3	− 00
		March 4 to 11					Ma ch 4	+ 462	− 007	+ 3	− 002
		11 13	+ 1 88	+ 0 59	+ 75	+ 39	11	+ 38	+	+ 8	+ 002
		13 19	+ 6 09	− 2 65	+ 5 99	− 68	13	+ 4	− 4	+ 009	− 001
		19 20	+ 9	− 0 76	+ 45	− 0 64	19	+ 029	− 24	+ 06	− 005
							20	0 5	− 29	+ 003	− 006
Dehra Dún (E) and Amritsar (W)	1 m 44	Ap il 1 to 2	+ 3 52	− 3 39	+ 3 32	− 3 6	April 1	+ 0 143	− 146	+ 3	− 03
		2 8	+ 3 64	− 3 46	+ 3 60	− 3 55	2	+ 147	− 46	+ 031	− 031
		3 10	+ 40 34		+ 4 61		3	196	− 4(	+ 42	− 03
		10 11	+ 7 06		+ 7 02		10	+ 26,	− 4	+ 057	− 30
		11 12	+ 7 02	− 3 44	+ 7 6	− 3 8	11	+ 294	− 4	+ 06	− 30
							12	+ 295	− 40	+ 063	− 03
Dehra Dún (E) and Agra (W)	0^m 9^s	April 20 to 21	+ 0 85	+ 4 5	+ 0 68	+ 4 35	April 20	+ 0 32	+ 85	0 000	0 000
		21 22	+ 98	+ 4 38	+ 98	+ 4 41	1	+ 36	+ 84	000	000
		" 22 23	+ 87	+ 4 21	+ 89	+ 4 21	22	+ 39	+ 80	000	00
		" 23 24	+ 42	+ 4 27	+ 36	+ 4 25	23	+ 026	+ 176	000	00
		" 24 25	+ 35	+ 4 34	+ 31	+ 4 29	24	+ 015	+ 179	000	000
							25	+ 0 4	+ 180	000	000

NOTE.—For the Dehra Dún Experimental Arc there are no clock rate corrections the two stations being on the same meridian

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE ΔL

AND THE RETARDATION OF SIGNALS ρ

AGRA (E) AND MOOLTAN (W)

Astronomical Date	Instrumental Position E	Instrumental Position W	Apparent Difference of Longitude by Observation with E Clock $= \Delta L - \rho$: By N Stars	By S Stars	Means	W Clock $= \Delta L + \rho$: By N Stars	By S Stars	Mean
1885			m	m	m	m	m s	m s
N h 23	*I P E*	*I P E*	26 8 789	26 8 85	26 8 8 8			
			18 815	18 818				
	I P W					26 19 4	26 19 103	26 19 079
						19 040	19 057	
24		*I P W*	19 053	19 012	19 033			
			19 050	19 0 8				
	I P E					19 066	19 051	19 023
						18 984	18 989	
25		*I P E*	18 903	18 926	18 878			
"			18 803	18 881				
	I P W					19 046	19 113	19 052
"						19 032	19 015	
26		*I P W*	19 093	19 154	19 135			
			19 48	19 44				
	I P E					19 7	19 185	19 145
						19 122	19 103	
27		*I P E*	18 8 1	18 852	18 771			
			8 672	18 747				
	I P W					19 093	19 099	19 086
						19 56	19 097	
28		*I P W*	9 09	19 30	19 109			
			19 085	19 11				
	I P E					19 016	19 089	19 029
						8 966	19 43	
Means	*I P E*	*I P E*	26 8 99	26 18 846	26 18 822			
	I P W	*I P W*	9 090	19 095	19 092			
		I P E				26 19 064	26 19 081	26 19 073
	I P E	*I P W*				19 054	19 077	19 066
General Mean			26 18 944	26 18 971	26 18 957	26 19 059	26 19 079	26 19 069

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 26^m + \frac{1}{2}(18\ 957 + 19\ 069) = 26^m\ 19^s\ 013$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(19\ 069 - 18\ 957) = +0^s\ 056$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE ΔL

AND THE RETARDATION OF SIGNALS ρ

DEESA (E) AND MOOLTAN (W)								
Astronomical Date	Instrume tal Po t n at		Apparent D ff e of Lo g tude by Observat o s with					
			E Clock = $\Delta L - \rho$			W Clock = $\Delta L + \rho$		
	E	W	By N St rs	By S Stars	M s	By N Sta s	By S Stars	Means
1885			m	m	m	m	m s	m s
D cember 7	*I P W*	*I P W*	2 58 554	2 58 58	2 58 589			
			58 629	58 592				
	I P E					2 58 640	2 58 678	2 58 646
						58 655	58 6 1	
8		*I P E*	58 650	58 636	58 650			
			58 660	58 654				
	I P W					58 729	58 708	58 703
						58 74	58 633	
" 9		*I P W*	58 553	58 583	58 572			
"		"	58 545	58 606				
	I P E					58 6 9	58 612	58 597
						58 614	58 542	
11		*I P E*	58 460	58 39	58 448			
			58 490	58 449				
	I P W					58 744	58 727	58 731
"						58 729	58 725	
12		*I P W*	58 489	58 51	58 505			
			58 477	58 545				
	I P E					58 576	58 545	58 544
						58 5 4	58 540	
13		*I P E*	58 454	58 483	58 4 8			
"			58 434	58 300				
	I P W					58 6 1	58 547	58 584
						58 584	58 595	
Means	*I P W*	*I P W*	2 58 541	2 58 569	2 58 555			
	I P E	*I P E*	58 525	58 486	58 505			
		I P W				2 58 603	2 58 588	2 58 596
	I P W	*I P E*				58 690	58 656	58 673
General Means			2 58 533	2 58 527	2 58 530	2 58 647	2 58 622	2 58 634

Whence $\Delta L = \frac{1}{2}\left\{(\Delta L - \rho) + (\Delta L + \rho)\right\} = 2^m + \frac{1}{2}(58\ \ 530 + 58\ \ 634) = 2^m\ 58\ \ 582$

$$\rho = \frac{1}{2}\left\{(\Delta L + \rho) - (\Delta L - \rho)\right\} = \frac{1}{2}(58\ \ 634 - 58\ \ 530) = +0^s\ 052$$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE ΔL

AND THE RETARDATION OF SIGNALS ρ

AGRA (E) AND AMRITSAR (W)								
Astronomical Date	Instrumental Position		Apparent Difference of Longitude by Observation with					
			E Clock = $\Delta L - \rho$			W Clock = $\Delta L + \rho$		
	E	W	By N Stars	By S Stars	Mean	By N Star	By S Stars	Means
			m	m s	m	m	m	m
1885 December 21	*I P E*	*I P E*	12 34 701 34 668	12 34 708 34 708	12 34 696			
	I P W					12 34 741 34 796	12 34 778 34 803	12 34 780
22		*I P W*	34 724 34 726	34 724 34 68	34 714			
	I P E					34 739 34 779	34 709 34 779	34 752
23		*I P E*	34 791 34 739	34 779 34 763	34 768			
	I P W					34 809 34 862	34 862 34 914	34 862
24		*I P W*	34 687 34 755	34 68 34 620	34 686			
	I P E					34 645 34 705	34 622 34 682	34 663
26		*I P E*	34 641 34 508	34 508 34 613	34 568			
	I P W					34 6 2 34 657	34 649 34 624	34 635
27		*I P W*	34 675 34 773	34 795 34 783	34 756			
	I P E					34 844 34 8 9	34 897 34 922	34 873
28		*I P E*	34 668 34 648	34 600 34 665	34 645			
	I P W					34 663 34 55	34 7 3 34 780	34 725
29		*I P W*	34 687 34 78	34 747 34 740	34 739			
	I P E					34 739 34 734	34 734 34 7 7	34 729
Means	*I P E*	*I P E*	2 34 67	12 34 668	12 34 669			
	I P W	*I P W*	34 726	34 72	34 724			
		I P E				12 34 737	12 34 764	12 34 751
	I P E	*I P W*				34 52	34 757	34 754
General Mean			12 34 699	2 34 695	12 34 697	12 34 745	12 34 76	34 752

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 12^m + \frac{1}{2}(34\ \ 697 + 34\ \ 752) = 12^m\ 34\ \ 725$

$$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(34\ \ 752 - 34\ \ 697) = +\ 0^s\ 028$$

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE ΔL

AND THE RETARDATION OF SIGNALS ρ

AMRITSAR (E) AND MOOLTAN (W)

Astronomical Date	Instrumental Posit on at		Apparent D ff re f Lo g t d by Ob orvat ons with					
			E Cl k = $\Delta L - \rho$			W Clock = $\Delta L + \rho$		
	E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1886			m	m	m s	m	m	m s
January 5	*I P W*	*I P W*	13 44 243	13 44 253	3 44 288	13 44 42	13 44 396	13 44 398
			44 346	44 311		44 379	44 394	
6	*I P E*		44 459	44 357	44 414	44 398	44 2(3	44 360
			44 4 9	44 4		44 438	44 34	
9		*I P E*	44 53	44 75	44 126	44 90	44 272	44 188
			44 2	44 55		44 33	44 58	
" 10	*I P W*		44 84	44 69	44 237	44 219	44 271	44 276
			44 297	44 97		44 284	44 328	
12		*I P W*	44 370	44 3 5	44 3 8	44 4 2	44 4 7	44 411
			44 260	44 335		44 39)	44 424	
14	*I P E*		44 262	44 277	44 257	44 257	44 3 5	44 295
			44 260	44 230		44 3 7	44 302	
19		*I P E*	44 54	44 7	44 57	44 3 7	44 247	44 258
			44 174	44 27		44 72	44 97	
Means	*I P W*	*I P W*	13 44 3 5	3 44 30	13 44 3 3	13 44 400	13 44 408	13 44 404
	I P E		44 3 0	44 321	44 336	44 353	44 3 3	44 3 8
		I P E	44 15	44 33	44 4	44 8	44 9	44 224
	I P W		44 9	44 83	44 37	44 5	44 300	44 76
G neral Mea s			13 44 274	13 44 235	3 44 255	13 44 308	3 44 3 8	3 44 3 8

Whence $\Delta L = \frac{1}{2}\left\{(\Delta L - \rho) + (\Delta L + \rho)\right\} = 13^m + \frac{1}{2}(44\ \ 255 + 44\ \ 308) = 13^m\ 44\ \ 281$

$\rho = \frac{1}{2}\left\{(\Delta L + \rho) - (\Delta L - \rho)\right\} = \frac{1}{2}(44\ \ 308 - 44\ \ 255) = +\ 0\ \ 027$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE ΔL

AND THE RETARDATION OF SIGNALS ρ

MOOLTAN (E) AND KARACHI (W)

Astronom cal Date	I tru t l P t n t		Appare t D ff of Loı gıtud by Ob ervat n w th					
			F Cl k = $\Delta L - \rho$			W Clo k = $\Delta L + \rho$		
	E	W	By N Stars	By S Stars	M n	By N St rs	By S Stars	M ns
1886			m	m	m	m	m	m
Jan ry 27	*I P E*	*I P E*	17 4 9 6	7 42 35	7 4 937	17 42 22	17 4 68	17 42 057
			4 874	4 932		42 44	4 095	
28	*I P W*		41 927	4 00	4 962	42 3	42 101	42 80
			41 922	41 996		42 028	42 059	
29		*I P W*	41 816	41 880	41 894	42 00	41 984	41 970
			41 904	4 975		4 928	41 966	
31	*I P E*		4 864	4 875	41 887	42	4 938	42 009
			41 9	4 887		42 55	4 03	
February 2		*I P E*	41 882	41 894	41 919	42 015	42 84	42 107
			4 9 2	41 989		42 145	42 184	
3	*I P W*		41 9 4	4 00	4 93	42 109	42 143	4 103
			4 839	4 971		42 037	42 123	
Means	*I P E*	*I P E*	17 41 894	17 41 963	17 41 928	17 42 057	1 42 108	17 42 082
	I P W		41 90	4 992	4 946	42 076	4 07	42 09
		I P W	41 86	4 9 8	41 894	41 964	41 975	4 97
	I P E		41 893	41 88	4 887	42 034	4 985	42 009
G ral M			7 4 887	17 4 94	7 4 914	7 42 033	17 42 044	17 42 038

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 17^m + \frac{1}{2}(41\ \ 914 + 42\ \ 038) = 17^m\ 41\ \ 976,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(42\ \ 038 - 41\ \ 914) = +\ 0^s\ 062$

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE ΔL

AND THE RETARDATION OF SIGNALS ρ

PESHAWAR (F) AND MOOLTAN (W)								
Astronomical Date	Instru ental Pos t on t		Appare t Diff of Lo git d by Ob rv t on with					
			E Cl k = ΔL − ρ			W Cl ok = ΔL + ρ		
	E	W	By N Stars	By S St rs	M	By N Stars	By S Stars	Means
1886			m	m	m	m	m	m s
February 9	*I P E*	*I P E*	o 27 3	o 27 348	7 365	o 27 632	o 27 517	o 27 574
			27 336	2 473		27 543	27 604	
10	*I P W*		27 43	27 5 7	27 436	27 5 2	27 643	27 564
			27 365	27 44		27 488	27 604	
11		*I P W*	27 5 5	27 57	27 51	27 6)8	27 695	27 669
			27 435	27 52		27 6 9	27 664	
12	*I P E*		27 325	27 32	27 375	27 392	27 387	27 436
			27 43	27 423		27 437	27 527	
17		*I P E*	27 235	27 36	27 321	27 522	27 441	27 505
			27 3 8	27 3(		27 59	7 467	
18	*I P W*		27 473	7 38	27 435	27 54	27 483	27 545
			27 4 5	27 481		27 599	27 554	
Means	*I P E*	*I P E*	o 27 3	o 27 386	o 27 343	o 27 572	o 27 507	o 27 54
	I P W		27 4 8	27 453	27 436	27 538	27 571	27 555
		I P W	27 475	27 546	27 5 0	27 659	27 680	27 669
	I P E		27 379	27 372	27 375	27 415	27 457	7 436
General Means			o 27 393	27 439	7 4 6	o 7 546	7 554	o 27 550

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 0^m + \frac{1}{2}(27\ \ 416 + 27\ \ 550) = 27\ \ 483$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(27\ \ 5{,}0 - 27\ \ 416) = +\ 0^s\ 067$

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE ΔL

AND THE RETARDATION OF SIGNALS ρ

AMRITSAR (E) AND PESHAWAR (W)

Astronomical Date	In trum tal P t t		Apparent D ff en e of Longitı de by Ob erv tion w th					
			E Cl k = ΔI − ρ			W Cl k = ΔL + ρ		
	E	W	By N St rs	By S Stars	M ns	Ry N St rs	By S Stars	Mea s
1886			m s	m		m	m	m s
F bruary 24	*I P W*	*I P W*	13 16 898	3 6 926	13 16 908	13 16 968	13 17 046	13 17 000
			16 943	16 866		16 966	17 020	
March 4	*I P E*		16 666	16 681	6 655	16 798	16 99	16 58
			16 613	16 659		16 703	16 730	
11		*I P E*	16 743	16 546	16 632	16 727	16 770	16 05
			16 640	16 598		16 o	16 613	
13	*I P W*		16 951	16 712	6 822	16 942	16 945	6 948
			16 867	16 759		16 989	16 9 7	
19		*I P W*	16 814	16 757	16 768	16 855	16 8 3	16 821
			16 804	16 697		16 8 8	16 8 6	
20	*I P E*		16 631	16 494	16 595	16 704	16 632	6 698
			16 681	6 573		16 784	16 672	
Means	*I P W*	*I P W*	13 6 865	13 6 8 2	13 6 838	13 16 899	13 6 921	13 16 910
	I P E		16 648	16 602	6 625	16 747	16 708	6 7 8
		I P E	6 692	16 572	16 632	16 719	16 692	16 705
	I P W		16 909	16 736	16 822	16 966	16 93	6 948
Ge ral M s			13 6 778	13 16 680	13 16 729	13 16 833	13 16 813	13 16 823

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 13^m + \frac{1}{2}(16\ \ 29 + 16\ \ 823) = 13^m\ 16\ \ 776$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(16\ \ 823 - 16\ \ 729) = +0\ \ 047$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE ΔL AND THE RETARDATION OF SIGNALS ρ

DEHRA DŪN (E) AND AMRITSAR (W)									
Astronomical Date		Instrumental Position at		App rent Diff re ce of Lo g t d by Ob rv t on w th					
				E Clo k = ΔL − ρ			W Cl k = ΔL + ρ		
		E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	M ans
1886				m	m	m	m	m	m
April	1	*I P E*	*I P E*	12 41 862	12 41 859	12 41 829	12 41 998	12 41 933	12 4 975
				4 77	4 82		42 005	41 963	
	2	*I P W*		42 093	42 085	42 047	42 58	42 173	42 180
				4 988	42 23		42 8	42 8	
	3		*I P W*	4 6	42 44	42 049	42 58	42 75	42 220
				42 039	42 006		42 242	42 203	
	10	*I P E*		41 839	41 908	41 866			
				41 859	41 859				
	11		*I P E*	4 85	41 884	41 855	41 939	4 876	41 952
				4 841	4 844		42 43	4 95	
	12		*I P W*	4 8 2	41 737	41 767	4 932	41 836	41 841
				4 8 5	41 7 2		4 8 3	4 774	
Means		*I P E*	*I P E*	12 4 832	12 4 852	12 41 842	12 41 996	12 4 93	12 4 964
		I P W		42 04	42 054	4 047	42 183	42 177	42 80
			I P W	42 3	4 75	42 49	42 25	42 89	42 2
		I P E		41 831	41 8 2	41 8 6	41 878	4 805	41 84
Gen ral M ans				2 4 93	12 4 94(	12 41 939	12 42 077	12 4 5	2 42 05

Whence $\Delta L = \frac{1}{2}\left\{(\Delta L - \rho) + (\Delta L + \rho)\right\} = 12^m + \frac{1}{2}(41\ \ 939 + 42\ \ 051) = 12^m\,41\ \ 995$

$\rho = \frac{1}{2}\left\{(\Delta L + \rho) - (\Delta L - \rho)\right\} = \frac{1}{2}(42\ \ 051 - 41\ \ 939) = +0\ \ 0{,}6$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE ΔL

AND THE RETARDATION OF SIGNALS ρ

DEHRA DÚN (E) AND AGRA (W)								
A t om al D te	In t t l l t t		App r t D ff n f L git de by Ob ervatio s th					
			F Cl k = $\Delta L - \rho$			W Cl k = $\Delta L + \rho$		
	E	W	By N St	By S Stars	M an	By N St s	By S Stars	Mean
1880			m	m	m		m s	m
Ap l 20	*I I E*	*I P E*	0 7 4	0 7 75	7 092	7 2 7	0 7 2	7 7
			7 093	7 076		7 75	7 236	
21	*I P W*		7 32	7 265	7 272	7 45	7 33	7 377
			7 257	7 246		7 369	7 356	
22		*I P W*	7 27	7 23	7 224	7 257	7 99	7 283
			7 87	7 4		7 93	7 8	
23	*I P E*		7 64	7 3	7 130	7 7	7 49	4
			7 97	7 44		7 87	7 4	
24		*I P E*	7 5	7 83	7 206	74	7 3	7 278
			7 1 7	64		7 245	7 29	
5	*I P W*		7 280	7 34	7 25	7 4 4	7 3 5	7 338
			7 99	7 84		7 3 5	7 88	
Mea	*I P E*	*I P E*	0 7 49	0 7 5	7 49	0 7 22	0 7 260	0 7 243
	I P W		7 264	7 259	7 262	7 382	7 333	357
		I P W	7 229	7 2 9	7 2 4	7 275	7 29	7 283
	I P E		7 131	7 129	7 30	7 97	7 232	7 2 4
G eral Mean			7 93	0 7 189	0 7 191	0 7 270	0 7 79	7 274

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 0^m + \frac{1}{2}(7\ \ 191 + 7\ \ 274) = 0^m\ 7\ \ 233,$

$$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(7^s\ 274 - 7\ \ 191) = +0^s\ 042$$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE ΔL

AND THE RETARDATION OF SIGNALS ρ

Astronomical Date	Instrumental Position E	Instrumental Position W	App. Diff. of Long. — E Clock = ΔL − ρ: By N Stars	By S Stars	Means	W Clock = ΔL + ρ: By N Stars	By S Stars	Means
1886							s	
May 5	*I P W*	*I P W*	− ,98	− 7	− 6 16	− 87	− 7	− 0 098
			− 5	− 43		− 86	−	
6	*I P E*		− 27(	−)	− 18	− 86	− 166	− 151
			− 55	− 3		− 33	− 8	
7		*I P E*	− 73	− 3	− 9	− 4)	− 77	− 095
			− 15	− 58		− 027	− 28	
8	*I P W*		07	−	+ 43	07	+ 7	09
			85	89		37	37	
Mean	*I P W*	*I P W*	− 25	− 7	− (	− 8	− 9	− 98
	I P E		− 2 6	− 47	− 8	− 60	− 42	− 5
		I P E	− 44	− 95	−)	− 88	− 3	− 95
	I P W		46	+ 39	+ 43	+ 5	+ 77	+ 9
General Mean			−)	− 77	− 13	− 57	− ()	− 63

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = \frac{1}{2}(-0\ 093 - 0\ 063) = -0\ 078$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(-0\ 063 + 0\ 093) = +0\ 015$

ELECTRO-TELEGRAPHIC LONGITUDES

1887-88

INDIAN ARCS

ABSTRACT OF THE OBSERVATIONS

AND

REDUCTION OF THE RESULTS

NOTE

The Explanation of *Table I* given on page 2 applies equally to the observations of 1887 88 in which the same Telescopes were used with the same Micrometers and the same wire systems

Astronl Date	Station	Instrumental Position	Collimation C	C	c	c	Level M	b	Remarks	Station	Instrument	Collimation C	C	c_1	c	Level M	b	Remarks
			d	d	d	d	d	d				d	d	d	d	d	d	
1887 Dec 13	MADRAS (Telescope No 2)	*I P E*	67 1	65 0	+4 5	+3 6	65 2	+2 8	Mean C *I P E* = 69 7 *I P W* = 69 General Mean = 69 5	BANGALORE (Telescope No 1)	*I P E*	49	50	− 1 3	− 2 2	47 1 46 8	+ 1 5	Mean C from first six nights only *I P E* = 48 6 *I P W* = 48 7 General Mean = 48 7
			68 1				68					47 7				47 6		
14		*I P W*	71 3	70	+0 5	−0 4	65 4	−4			*I P E*	49 3	5 0	− 1 3	− 2 2	48 8	− 0 5	
			72				6 6					48 9				49 5		
17		*I P W*	68 3	70 0	+ 5	−0 4	69 1	+ 4			*I P W*	47 9	50 0	+ 1 3	+ 4	45 2	− 3 7	
			66 5				7 6					49 2				44 7		
19		*I P E*	7 4	7	− 5	− 4	72 7	−1 1			*I P W*	48 2	5	+ 3	+ 0 4	48 9		
			70 5				72 9					49 5				48 5		
29		*I P E*	72	7	−2 5	−3 4	5	− 2			*I P k*	48 9	5 0	− 3	− 2	47 2	+ 1 5	
			7 8				7 9					48 7				47 2		
30		*I P E*	69 9	7	− 5	− 4	3 5	−4 9			*I P E*	48	50	− 1 3	− 2 2	47 9	+ 0 6	
			67 7				75 3									48 2		
1888 J 2		*I P W*	68	68	− 5	− 4	68 9	− 6			*I P W*		5	−8	−82*	47	−85	
			69				68 8				*I P W*	3 4	35	+ 3	2	33	+ 0	
												3 6				3 3		
Jan 15	BANGALORE (Telescope No 1)	*I P W*	32	30	−3 8	−4 7	32	− 6	Mean C *I P E* = 34 *I P W* = 33 5 General Mean = 33 8	NAGARKOIL (Telescope No 2)	*I P W*	77 (	78	+ 8	−	73 7	− 2 8	Mean C *I P E* = 75 6 *I P W* = 78 8 General Mean = 77 2
			33 7				3					77 5				75		
16		*I P E*	33 9	35 0	− 2	−2	34	− 5			*I P W*	7 9	78 0	+ 0 8	− 0 1	78 2	+ 1 1	
			33 9				34 6					8				78 3		
17		*I P E*	34	3 0	−	−	33 3	− 2			*I I F*	76	75 0	+	+ 3	78 4	− 2	
							34 6					6				78 3		
18		*I P W*	34	35 0	+ 2	+0 3	35				*I P I*	75	75 0	+ 2 2	+ 1 3	77	− 0	
							34 (					75 3				77 5		
19		*I P W*	33 6	35 0	+ 2	+0 3	35				*I P W*	78 6	78	+ 8	−	75 8	− 9	
							34 5					9 3				76 7		
20		*I P E*	33 8	35 0	− 2	−2	32 5	+ 4			*I P W*	8 2	8	+ 2 8	+ 9	79	+ 1 8	
							3 3					8 5				8 7		
Feb. 2	MADRAS (Telescope No. 1)	*I P E*	36 4	35 0	− 9	−2 8	34 5	− 3	Mean C *I P E* = 34 5 *I P W* = 3 6 General Mean = 33	NAGARKOIL (Telescope No 2)	*I I E*	75 (	75	4	+ 1 5	75 8	+ 1 4	Mean C *I P E* = 76 2 *I W P* = 78 5 General Mean = 77 4
			34 5				34 3					75)				76		
3		*I P W*	3 3	3	−3 1	−4	3 6	− 8			*I I E*	5 7	75	+ 2 4	+ 5	77 7	− 0 9	
			31 7				3 9					75 8				8 9		
" 4		*I P W*	3	30	−3 1	−4 0	32 6	−0			*I P W*	8 2	80 0	+ 2 6	+ 7	6 7	− 0 8	
			31 6				32 2					79				76 5		
" 5		*I P E*	33 7	35	−1 9	−2 8	3 1				*I P W*	76 9	76	− 4	− 2 3	8	+ 2 7	
			35				32 6					77 7				8 2		
" 6		*I P E*	33 6	35 0	−1 9	−2 8	3 4	+1			*I P E*	77 7	77 0	+ 0 4	− 0 5	6 1	+ 0 9	
							32 5					75 8				76 9		
7		*I P W*	33 3	35 0	+1 9	1 0	3 7	+0 2			*I P E*	76 6	76 0	+ 1 4	+ 0 5	76 5	+ 0 6	
			31 4				34 9					76 4				77		

* On January 2nd 1888, at Bangalore the object-glass of the Telescope was taken off and cleaned. A great change in C ensued, and the value of C for this date could not be combined with those of the six former dates in deducing the general mean for the arc The general mean has therefore been deduced from the first six nights only and used for those nights only in computing c and b As C was not determined *I P E* after the cleaning of the object-glass, no mean value of it is obtainable for January 2nd; but both on this Arc and the following one, the amount that C_o, when taken with Telescope No. 1 *I P W* differed

A tro l D te	Stat n	Instru m tal Po it o	Coll m t on C	C			Le l M	b	Remarks	St t n	I tru tal I t	C ll mat on C	C		c	Le el M	b	Remarks
			d	*d*	*d*	*d*	*d*	*d*				*d*	*d*	*d*	*d*	*d*	*d*	
1888 F b 18	NAGARKOIL (T lescope No 2)	*I P E*	75 9	75	+2 1	+ 2	76 5	−0 3		MANGALORE (T l p N 1)	*I P E*	45 8	45	−0 4	−1 3	44 8	−0 9	
			75 7				8 2					45				46		
19		*I P W*	77	7	−0	−1 0	77 5	+0 5			*I P E*	4 4	45	−0 4	−1 3	45	−0 8	
			77 3				77 6		M an C			4				45 3		M n C
20		*I P W*	78 9	79 0	+ 9	1	76 8	− 4	*I P E* = 5 1		*I P W*	45 7	45	+ 4	− 5	45 4	+ 7	*I P E* = 43 9
			79 3				76 5		*I P W* = 79			44 9				45 2		*I P W* = 45 2
21		*I P E*	73 6	74	+3	+2 2	79	−2	G ral		*I P W*	44 4	45	+ 4	− 5	44 7		G ral
			5				79 5		M n = 77							44 5		M an = 44 6
22		*I P E*	75 9	76	+1	+	75	+ (			*I P W*	45 4	45 0	4	− 5	45	+ 3	
			74 5				(									44 8		
24		*I P W*	8 6	8 0	+ 9	+2	79	+			*I P W*	4(	45	+ 4	− 5	4	+ 9	
			8 2				79 4					44 4				45 7		
Mar 5	MADRAS (T l sc p N 2)	*I P E*	7 9	77	+	+ 3	78 6	+ 5		MANGALORE (T les pe N 1)	*I P W*	4 7	4	9	− 8	4 6	−	
			77 8				8 8					4 5				4 7		
7		*I P W*	79 3	80	+0 8	−	79 7	+ 9			*I P W*	4	4 0	− 9	−2 8	4	− 2	
			79 8				8 4		M a C							4 4		M n C
8		*I P W*	8	8	+2 8	+)	8 4	+	*I P E* = 78 2		*I P E*	43 3)	40 0	+ 9	+	4	+ 5	*I P E* = 4 2
			8 6				8 4		*I P W* = 8			4 3				4 8		*I P W* = 42 6
9		*I I E*	78 5	78	+ 2	+ 3	8 6	7	G l		*I P E*	4 8	4	+ 9	+	4 9	−2	G l
			79 6				8 3		M = 79 2							45 9		M an = 4 9
10		*I I E*	77 3	7 0	+	+ 3	75 4	+3 7			*I P W*	43	45	+3	+ 2	4 6	+ 0	
			8				75 5					43 8				43 2		
12		*I I W*	) 8	8	+ 8	−0	77	−1 3			*I P W*	44	45	+3	+2	43 5	+ 3	
			8				78 5									4 9		
Ma 21	BELLARY (T l sc pe N 2)	*I I E*	95 7	95	+ 1	+	94 4	2 8		MANGALORE (T les pe N 1)	*I P E*	42 9	4	+ 9	+1 0	41 3	− 8	
			96 3				)4					4 8				44		
2		*I P W*	96	95	+2	+1 2	96 6	+ 8			*I P E*	4	40	+ 9	+1 0	4 8	−0 8	
			96				96					42 3				43 6		
23		*I P E*	97 3	95	2	+ 2	92 5	+4 3	Mean C		*I P F*	4 4	40 0	+1 9	+	41 2	+	Mean C
			97				93									42		
24		*I P W*	99	100 0	+2 9	+2 0	95 5	−0 3	*I P E* = 96 4		*I P E*	42 3	40	+1 9	+1 0	4	+0 8	*I P E* = 4 6
			96 6				98		*I P W* = 97 7			41				4 2		*I P W* = 42 1
2		*I P W*	)8	100 0	2 9	+	95 5	−	G ral		*I P W*	4 8	45	+3	+	42 5	+0	G eral
			98				98 4		M n = 9			4 6				4 4		Mean = 41 9
26		*I P W*	97 7	98 0	+0 9	0	96 9	−0 5			*I P W*	43 6	45 0	+3 1	+2 2	41 5	−0 1	
			96 5				96 3					4 4				41 3		
27		*I P E*	96	97 0	+0 1	−0 8	02 5	−5 4			*I P W*	42 5	45	+3	+2 2	42 3	−0 9	
			96				102 5									39 7		

from its gen ral mean was so trifling tl at it was consid red permissible to adopt as the value of C for J n ary 2nd th mean of th two determinations taken on January 2nd C was hanged from 50 to 135 0 and M from 47 0 to 133 0 at $6^h\ 0^m$ (d real time) so fo all stars o this date that transited before $6^h\ 0^m$ the values c = − 82 9, and b = − 85 0 should be adopted and for all stars that transited after $6^h\ 0^m$ the values c = + 2 1 and b = + 0 2

Astronl Date	Stati n	I st me t l Pos tio	Collimation C	C	c	c	Lev l M	b	Remarks	Stati n	I t u m t l l at	Coll mation C	C	c	c	Level M	b	Remarks
1888	MANGALORE (T lescope No 1)		*d*	*d*	*d*	*d*	*d*	*d*		BOMBAY (T l scope N 2)		*d*	*d*	*d*	*d*	*d*	*d*	
April 4		*I P W*	42 7	45 0	+3 2	+2 3	42 2	−0 2	M an C		*I P W*	97 8	98 0	0 0	−0 9	95 2	−3 4	Mean C
							41		*I P W* = 42 2			96 8				93 9		*I P E* = 99 4
7		*I P W*	41 3	45 0	+3	+2 3	42 6	+0 9	*I P E* = 4 3		*I P W*	95 9	97 0	−1 0	−1 9	00 8	+2 7	*I P W* = 96 6
			42				42 8		Ge ral			95 9				100 5		General
8		*I P E*	4 4	40 0	+1 8	+0 9	39 2	+2 6	Mea = 4 8		*I P E*	99 8	100 0	−2 0	−2 9	98	−0 6	Mean = 98 0
			41				39 2					99 0				99 2		

TABLE II DEDUCTION OF DEVIATION CORRECTION *a*, FROM STAR OBSERVATIONS

Arc	Stati n	Astron mical Date	In trum tal Post n	Clock n u	Star	Culm at on	N f W re Ob rved	D a ti Consta t A	Observ d T m f Tra t	C rrect o f: C lli m ti	Lev l	P n Eq a ti Q	Approximat Clock Rate	Seconds f C rrect d T m f Trans t	R ght Ascen n (In reased by 12 h urs f Lower Culmination)	Apparent Clock Corrections	Ded ed Valu f De tion Correction
MADRAS (E) AND BANGALORE (W)	MADRAS (Latit d 3 4)	1887							*h m*	*s*		*s*	*s*	*s*	*h m s*	*m s*	*d*
				E	383 Gr 72	U	5	−0 1261	4 7 32 40	+0 40	+0 0	+2 14		35 04	4 7 40 88	+ 0 5 84	− 68 5
					431	U	1	+0 0 8	4 3 4 25	+ 8	+0 05	+2 4	−0 0	6 5	4 3 12 48	− 4 03	
		Dec. 13	*I P E*	W	514	U	4	− 25 4	5 9 54 00	+0 8	+0 3	+2 4		57 24	5 26 2 26	+ 16 24 02	− 76 7
					Columbæ	U		+0 0 99	5 9 3 6	+ 0	+0 06	+2 14	−0	33 36	5 35 36 58	+ 16 3 22	
				E	383 Gr 72	U	5	− 26	4 7 41 50	− 06	− 2	+2 3		43 37	4 7 40 86	− 0 2 51	− 5 7
					431	U	6	+0 0 80	4 3 3 78	− 01	− 08	+2 3	−0 0	5 8	4 31 2 48	− 0 3 33	
		14	*I P W*	W	514	U	4	−0 2514	5 16 34 8	−0 10	−0 40	−2 13		32 17	5 26 21 30	+ 9 49 13	− 6 5
					Columbæ	U	1	0 99	5 25 51 55	−0 01	− 08	−2 13	−0 1	49 23	5 35 36 59	+ 9 47 36	
				E	383 Gr 72	U	5	−0 1261	4 7 40 60	−0 05	+0 10	+2 13		42 8	4 7 40 80	− 0 1 98	− 22 1
		17	*I P W*		431 "	U	11	+0 0180	4 31 15 50	−0 01	+0 03	+2 13	− 0	17 64	4 31 12 48	− 0 5 16	
				W	514 "	U	2	−0 2514	5 15 40 30	−0 40	−0 30	−2 14		37 46	5 26 21 51	+ 10 44 05	+ 5 6
		19	*I P E*	"	Columbæ	U	11	+0 0199	5 24 53 27	−0 04	−0 05	−2 14	+0 01	51 05	5 35 36 63	+ 10 45 58	
				E	514 Gr 72	U	2	−0 2514	5 26 28 70	−0 90	− 10	−2 14		25 56	5 26 21 56	− 0 4 00	− 9 5
		20	*I. P E*		Columbæ	U	11	+0 0199	5 35 45 50	−0 09	−0 03	−2 14	0 00	43 24	5 35 36 66	− 0 6 58	

Arc	Station	Astronomical Date	Instrumental Position	Clock use	Star	Culminati n	f W res Observed	Devia tio Co t t A	Observed Time of Trans t	Corrections fo: Coll matio	Level	Pen Equa ti n Q	Approxim t Clock Rate	Seco ds f Corre ted T m of Tran t	Right Asc n on (I reased by 12 h r f L wer Culm t n)	Appare t Clock Correcti ns	Ded ced Valu of D viati n Correction a
									h m	s			s	s	h m s	m	d
MADRAS (E) AND BANGALORE (W)	MADRAS (Latitud 3 4)	1887 Dec 30	I P E	W	8 Ursæ Mi oris	L	3	+0 3737	5 57 16 3	+ 0 5	+0 3	+2 17		9 7	6 8 8 88	+ 0 49 6	− 26 8
					51 Cephei	U	4	−0 4440	6 36 56 80	− 0 60	−0 6	−2 17	+0 04	53 4	6 48 5	+ 11 11 54	
		1888 Jan 2	I P W	E	514 G 72	U	3	− 5 4	5 26 30 43	− 0 60	−0 04	−2 8		27 6	5 26 2 44	− 6 17	− 2
					Col mbæ	U		+0 99	5 35 45 5	− 06	− 2	−2 8		4 89	5 35 36 66	− 6 23	
				W	8 Ursæ Minoris	L	3	+0 3737	5 57 3 37	+ 0 86	+0 03	+2 8		6 44	6 8 8 86	+ 2 42	− 2 2
					51 Cepl ei	U	4	−0 444	6 37 4 53	− 1 04	−0 09	−2 18	+0 04	1 6	6 48 5 45	+ 11 4 19	
	BANGALORE (Latitude 3 1)	1887 Dec 13	I P E	E	383 Gr 72	U	4	−0 1261	4 18 25 13	− 0 30	+0 08	0 0		24 9	4 7 40 88	− 10 44 03	+16 2
					431	U		+0 8	4 4 54 2	− 05	+0 3	0 00	−0 01	54 18	4 31 1 48	− 4 7	
		14	I P E	E	383 Gr 72	U	5	−0 126	4 18 24 80	− 0 29	−0 04	+2 62		7 09	4 7 40 86	− 1 46 3	+29 4
					431	U	1	+ 0 80	4 4 5 9	− 0 06	− 02	+2 62	−0 0	54 48	4 3 48	− 4 00	
				W	514	U	3	−0 5 4	5 7 22 3	− 0 59	− 4	00		21 68	5 26 2 3	− 1 0 38	+32 6
					C lumbæ	U	0	+0 0 99	5 36 30 92	− 0 06	−0 01	−2 62	−0	8 3	5 35 36 59	− 5 54	
		17	I P W	E	383 G 72	U	8	−0 26	4 18 29 77	+ 06	− 9	+ 6		3 5	4 7 40 80	− 51 45	+57 7
					431	U	0	+0 0 80	4 41 53 07	+ 0	−0 06	+2 61	−0	55 62	4 3 2 48	− 0 43 14	
				W	514	U	3	−0 2514	5 28 2 8	+ 0	−0 3	−2 61		18 97	5 26 1 43	− 11 7 54	+59 3
					C lumbæ	U		0 99	5 37 20 84	+ 0	− 07	−2 6	− 10	8 07	5 35 36 6	− 0 45	
		19	I P W	E	383 Gr 72	U	3	−0 1261	4 18 27 17	+ 0 05	0 00	+2 62		29 84	4 7 40 76	− 10 49 08	+33 2
					431	U	9	+0 0180	4 41 54 16	+ 0 01	0 00	+2 62	−0 0	56 78	4 31 12 48	− 10 44 30	
				W	514	U	3	−0 25 4	5 26 26 14	+ 0	0 00	−2 62		23 6	5 6 5	− 0 2	+33 4
					Columbæ	U	1	+0 0 99	5 35 32 29	+ 0	0 00	−2 6	+ 01	29 69	5 35 36 63	+ 0 6 94	
		29	I P E	E	514 Gr 72	U	3	−0 2514	5 37 1 5	− 56	+0	−2 63		8 44	5 26 21 56	− 46 88	+ 5 2
					Columbæ	U	10	+0 0199	5 46 24 79	− 0 06	03	−2 63	0 00	22 13	5 35 36 66	− 0 45 47	
		30	I P E	E	514 G 72	U	3	− 25 4	5 37 16 09	− 0 84	+0 04	−2 63		2 66	5 6 53	− 5 3	+22 4
					Col mbæ	U		0 0 99	5 46 24 38	− 0 06	+0 02	−2 63	0 00	71	5 35 36 66	− 10 45 05	
		1888 J n 2	I P W	E	514 Gr 72	U	2	−0 5 4	5 36 76 2	−2 89	−6 89	+2 63		50 06	5 6 21 44	− 10 28 62	−67 7
					Col mbæ	U		+0 99	5 46 3 06	− 2 25	− 56	−2 63	0 00	23 62	5 35 36 65	− 0 46 97	
				W	8 Ursæ Mi oris	L	3	+0 3737	6 8 16 77	+ 0 79	+ 0	+2 63		20 20	6 8 8 86	− 0 11 34	−88 0
					51 Cephei	U	3	− 4442	6 47 5 67	+ 0 96	+0 3	−2 63	0 04	4 07	6 48 5 45	+ 1 38	

Arc	Stat n	Astronomical Date	Instrumental Pos tion	Clock use	Star	Culmination	No. f Wires Observed	D via ti Co tant A	Observed Time of Transit	C rrections for C ll m t	Lev l	Pen Eq a- t on Q	Approximate Clock Rate	Seconds of C rrected Tim f Transit	Right Ascens n (Increased by 12 hours f Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
BANGALORE (E) AND NAGARKOIL (W)	BANGALORE (Latit d 3)	1888							h m			s			h m s	m	d
		Jan 15	I P W	E	51 C ph	U	3	− 4445	6 48 29 7	−2 9	−0 20	+2 58		29 46	6 48 5 94	− 23 52	+ 8 9
					C nis Majo is	U	1	+0 0170	6 54 3 47	−0 12	−0 03	+2 58		33 9	6 54 14 51	− 0 19 9	
				W	ξ Argûs	U	0	+0 0150	7 44 4 00	−0 1	−0 03	+2 58		6 44	7 44 36 09	+ 0 29 65	+ 9 3
					771 G 72	U	4	− 6	7 46 42 5	−0 60	− 08	+2 58		44 40	7 47 2 85	+ 0 28 45	
		16	I P E	E	51 Cephe	U	4	−0 4445	6 48 26 93	− 97	− 6	+2 60		28 5	6 48 5 90	− 0 22 60	+10 0
					Cani Majoris	U	0	+0 017	6 54 29 94	−0 5	−0 01	+2 6		32 48	6 54 14 51	− 0 27 97	
				W	ξ A gû	U	5	+0 015	7 44 4	−0 5	−0 01	+2 60		6 65	7 44 36	+ 0 29 45	+18 2
					771 G 72	U	5	− 6	7 46 43 48	− 26	− 2	+2 6		45 8	7 47 87	+ 0 27 7	
		17	I P E	E	51 C ph i	U	3	− 4445	6 48 5 33	− 97	−0 3	+ 6		26 95	6 48 5 83	− 21	+ 9 8
					C M j	U		7	6 54 8 53	−0 05	00	+2 6	C rrecti Nil	3	6 54 4 5	− 0 16 59	
		18	I P W	E	51 C ph	U		− 4445	6 48 7 5	+0 14	+ 4	+2 6		2 4	6 48 5 73	− 0 14 67	− 1 4
					C M j ris	U		+ 17	6 54 27 6	+	+ 2	+2 62		29 8	6 54 14 5	− 0 5 3	
				W	ξ A gûs	U		+0 0 5	7 44 4 76	+0	+0 2	+ 62		7 4	7 44 36 1	+ 0 28	+ 8
					771 Gr 72	U	4	−0 160	7 46 41 73	+0 04	+ 6	2 62		44 45	7 47 12 92	+ 0 28 47	
		19	I P W	E	51 C phe	U	3	− 4445	6 48 6 7	+0 5	+0 3	+2 60		9 58	6 48 5 62	− 3 96	+ 0 6
					C M jo i	U		+0 7	6 54 5 57	+ 1		+2 6		28 0	6 54 14 51	− 0 3 69	
				W	ξ A gûs	U		+ 5	7 44 5 56	+	+ 2	+ 6		8 9	7 44 36	+ 0 7 9	+ 1 8
					771 G 72	U	4	− 6	7 46 42 58	+ 4	+ 5	+2 60		45 27	7 47 2 95	+ 0 27 68	
		20	I P E	E	51 C ph	U	3	− 4445	6 48 6 00	− 97	+ 7	+ 73		7 93	6 48 5 5	− 0 12 42	+ 0 6
					C nis Maj ris	U	7	+ 7	6 54 3 94	− 5	0	+2 73		26 64	6 54 4 5	− 0 2 13	
				W	ξ A gûs	U		+0 5	7 44 7 35	−0 05	+0 3	+2 87		0 20	7 44 36 12	+ 25 92	+ 0 1
					771 G 72	U	5	−0 1160	7 46 44 40	− 27	+ 07	+ 87		47 7	7 47 12 98	+ 0 25 91	
	NAGARKOIL (Latitude 8° 11′)	1888															
		Jan. 15	I P W	E	51 Cephe	U	5	−0 4535	6 48 56 04	−0 5	− 24	+1 55		57 3	6 48 5 94	− 0 51 36	− 8 4
					Canis Majoris	U	1	+0 0154	6 55 8 33	0 00	−0 06	+1 55		9 82	6 54 24 51	− 0 55 32	
				W	ξ Argûs	U	11	+0 0133	7 44 38 90	0 00	− 05	−1 55		37 30	7 44 36 09	− 0 1 21	− 3 2
					771 Gr 72	U	5	−0 198	7 47 15 30	−0 0	−	− 55	C rrectio Nil	3 63	7 47 2 85	− 0 0 78	
		„ 16	I.P W	E	51 Cephei	U	2	−0 4535	6 48 55 3	− 05	10	+1 56		56 9	6 48 5 90	− 0 5	− 6 3
					Canis Majoris	U	12	+0 0154	6 55 6 87	0 00	+0 05	+1 56		8 48	6 54 14 51	− 0 53 97	
		„ 17	I P E	W	ξ Argûs	U	1	+0 0133	7 44 39·12	+0 03	− 03	−1 57		37 55	7 44 36 10	− 0 1 45	+ 1 8
					771 Gr 72	U	2	−0 1198	7 47 16 05	+0 16	−0 05	−1 57		14 59	7 47 12 90	− 0 2 69	

Arc	Stat n	Astro mi l Date	Instrumental Pos t on	Clock n use	Star	Culminat n	f W ires Observed	De ia t on Co ta t A	Obs rv d T me of Tran t	C rrecti ns for: C lli m t	L el	Pen Equ t on Q	Appro mat Cl k Rat	Se nd f C rrect d T m f Tran t	Right A n (I creased by 12 h urs f Lower C lmination)	Appa ent Clock Correcti s	Ded ced Val e of D viati n Correcti n
		1888							*h m*						*h m*	*m*	*d*
BANGALORE (E) AND NAGARKOIL (W)	NAGARKOIL (Lat t d 8°)			E	51 Cephei	U	4	−0 4535	6 48 56 43	+0 58	−	+1 58	C rrect n *N l*	58 58	6 48 5 73	− 0 52 85	+ 4 2
		Jan 18	*I P E*		Ca is M joris	U	1	+0 154	6 55 3 76	+ 63		+1 58		5 37	6 54 14 51	− 0 50 86	
				W	ξ A gûs	U	1	+0 33	7 44 39 35	+0 03	0	− 58		37 8	7 44 36	− 0 69	+ 4 1
					771 G 72	U	6	− 98	7 47 6 58	+ 16		− 58		5 6	7 47 12 93	− 2 23	
				E	51 Cephei	U	5	−0 4535	6 48 53 70	−0 05	−0 08	+1 56		55 13	6 48 5 63	− 49 50	+ 0 3
		19	*I P W*		Ca Majoris	U		+0 0 54	6 5 2 32	0 00	−0 2	+ 56		3 86	6 54 14 5	− 0 49 35	
				W	ξ A gûs	U	11	0 33	7 44 40 40	0 00	−0 0	− 56		38 8	7 44 36 12	− 0 2 70	+ 6 4
					771 Gr 72	U	8	− 98	7 47 8	−	− 4	− 56		6 5	7 47 2 95	− 0 3 55	
				E	51 C ph i	U	4	−0 4535	6 48 53 30	+0 86	+ 6	+ 56		55 88	6 48 5 5	− 0 50 36	+ 5 6
		20	*I P W*		C is Maj r	U	1	+0 0 54	6 55 0 59	+0 5	+ 3	+1 56		2 23	6 54 14 5	− 0 47 72	
				W	ξ A gûs	U		+ 33	7 44 4 27	+ 5	+0 4	− 56		39 8	7 44 36 13	− 0 3 67	+ 7 2
					771 Gr 72	U	8	−0 1198	7 47 8 85	+ 23	+0 09	− 56		17 6	7 47 2 98	− 0 4 63	
		1888															
MADRAS (E) AND NAGARKOIL (W)	MADRAS (Latitud 3 4′)			E	Argû	U		+ 4 6	8 20 5 6	− 2	−	+ 93	Correction *N l*	5 9	8 2 5 74	− 36 21	−16 9
		Feb 2	*I P E*		815 Gr 72	U		−0 2690	8 22 44 97	−0 77	−0 12	+1 93		46 0	8 22 5 05	− 30 96	
				W	Argû	U		+0 4	9 2 53 00	−0 12	−	+ 93		54 8	9 4 8 2	+ 3 4	− 1 7
					908 G 2	U		− 47	9 9 52)8	− 43	− 7	+ 93		54 4	9 8 3	+ 1 13 72	
		3	*I P W*	W	Argûs	U		+0 0411	9 2 52 00	−0 17	−0 01	+1 92		53 /4	9 14 8 21	+ 11 14 47	+ 0 6
					908 Gr 72	U		−0 147	9 9 54 44	−0 62	−0 05	+1 92		55 69	9 2 8 6	+ 47	
		4	*I P W*	W	Argûs	U		+0 0411	9 2 52 88	−0 17	−0 0	+1 89		54 59	9 14 8 2	+ 1 3 62	+ 0 8
					908 Gr 72	U		−0 1470	9 9 53 50	−0 62	−0 05	+ 89		54 72	9 21 8 19	+ 13 47	
				E	A gûs	U		+ 416	8 20 46 18	−0 12	+0 0	+ 90		47 97	8 20 5 72	− 32 25	− 4 1
		5	*I P E*		815 G 72	U		−0 690	8 22 44 80	−0 77	+0 03	+1 90		45 96	8 2 15 00	− 0 30 96	
				W	Argûs	U		+ 4	9 2 52 65	−0 12	+0 0	+1 90		54 44	9 4 8 2	+ 1 13 77	+ 6 4
					908 Gr 72	U		−0 147	9 9 54 18	−0 43	+0 02	+1 90		55 67	9 21 8 23	+ 11 12 56	
				E	A gûs	U		+0 4 6	8 2 44 66	−0 12	+0 01	+1 91		46 46	8 20 15 71	− 0 30 75	+ 0 7
		6	*I P E*		815 Gr 72	U		−0 2690	8 22 44 3	−0 77	+0 09	+1 91		45 96	8 22 14 98	− 0 30 98	
				W	Argûs	U		+0 041	9 2 52 09	−0 12	+0 01	+1 9		53 89	9 14 8 22	+ 11 14 33	+ 9 9
					908 Gr 72	U		−0 470	9 9 54 26	−0 43	+0 06	+1 91		55 80	9 21 8 27	+ 11 12 47	
				E	Argûs	U		+0 04 6	8 20 43 79	+0 04	0 00	+1 90		45 73	8 20 15 70	− 0 30 03	−10 2
		7	*I P W*		815 G 72	U		−0 2690	8 22 39 60	+0 29	+0 02	+1 90		4 81	8 22 14 96	− 0 26 85	
				W	Argûs	U		+0 0411	9 2 52 55	+0 04	0 00	+1 90		54 49	9 14 8 22	+ 11 13 73	− 3 1
					908 G 72	U		−0 1470	9 9 51 92	+0 15	+0 01	+1 90		53 98	9 21 8 30	+ 11 14 32	

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No. of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for: Collimation	Level	Pen Equation Q	Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
MADRAS (E) AND NAGARKOIL (W)	NAGARKOIL (Latitude 8°)	1888							h m s	s	s	s	s	s	h m s	m s	d
		Feb 2	*I P E*	W	Argûs	U	8	+0 0398	9 14 6 84	+ 06	+ 02	+ 55		8 47	9 4 8 20	−0 0 27	+24 4
					908 Gr 72	U	5	−0 1514	9 21 11 20	+ 24	+0 07	+ 55		13 06	9 21 8 13	−0 4 93	
		„ 3	*I P E*	E	Argûs	U	8	+ 0403	8 21 3 05	+0 06	−0 02	+1 55		4 64	8 20 15 74	−0 48 90	+ 9 9
					815 G 72	U	3	− 753	8 23 5 13	+ 43	− 06	+1 55		7 05	8 22 5 3	−0 52 02	
				W	A gûs	U	8	0 398	9 14 7 22	+0 06	−0 0	+ 55		8 82	9 14 8 21	−0 0 61	+24 4
					908 G 72	U	5	−0 5 4	9 21 1 68	+0 24	−0 4	+ 55		13 43	9 2 8 16	−0 5 27	
		4	*I P W*	E	Argûs	U	8	+0 0403	8 21 2 58	+0 07	−0 01	+1 55		4 19	8 20 15 73	−0 48 46	− 7 7
					815 G 72	U	5	− 2753	8 22 59 08	+0 47	−0 5	+ 55		61 5	8 22 15 02	−0 46 03	
				W	Argûs	U	8	+0 398	9 14 7 95	+ 06	−	+1 55		9 55	9 4 8 21	− 34	+ 1 2
					908 Gr 72	U	3	−0 1514	9 21 7 97	+0 27	−0 03	+1 55	Correction Nil	9 76	9 21 8 9	−0 1 57	
		5	*I P W*	E	Argûs	U	8	+ 0403	8 21 0 98	− 10	+ 05	+1 56		2 49	8 2 5 72	−0 46 77	+ 1 9
					815 G 72	U	4	−0 2753	8 23 33	− 68	17	+ 56		38	8 22 5 00	−0 47 38	
				W	Argûs	U	8	0398	9 4 7 51	− 0	+ 04	56		9 01	9 14 8 21	−0 80	+10 8
					908 G 72	U	5	− 5 4	9 2 9 80	−0 38	+0 2	+ 56		10	9 21 8 23	−0 32 87	
		6	*I P E*	E	Argûs	U	8	+0 4 3	8 20 59 67	− 2	+	+ 56		6 22	8 20 15 7	−0 45 5	+ 2 8
					815 G 72	U	5	−0 2753	8 2 59 92	− 5	+0 05	+ 56		61 38	8 22 14 98	−0 46 40	
				W	Argûs	U	8	+ 398	9 4 7 66	−		+ 56		9 22	9 4 8 22	−0 00	+ 9 4
					908 G 72	U	5	−0 1514	9 21 9 54	−0 08	+0 04	+1 56		11 06	9 21 8 27	−0 2 79	
		7	*I P E*	E	Argûs	U	8	+0 403	8 20 58 18	+0 02	+0 01	+1 57		59 78	8 20 15 70	−0 44 08	0 8
					815 Gr 72	U	5	− 753	8 57 55	+ 4	+ 4	+ 57		59 3	8 22 4 96	− 44 34	
				W	Argûs	U	8	+ 398	9 4 7 66	+ 2	+ 01	57		9 26	9 4 8 22	−0 1 4	+13 2
					908 Gr 72	U	5	− 5 4	9 2 0 2	0 07	+0 02	+ 57		86	9 2 8 30	− 3 56	
NAGARKOIL (E) AND MANGALORE (W)	NAGARKOIL (Latitude 8° 11)	1888															
		Feb. 18	*I P E*	E	Argûs	U		+ 398	9 14 3 93	+0 05	00	+1 55		5 53	9 4 8 6	+ 2 63	+14 9
					908 Gr 72	U	5	−0 15 4	9 21 6 90	+0 18	−0 0	+1 55	00	8 62	9 2 8 41	−0 2	
				W	981	U	5	−0 1810	10 8 2 62	+0 23	−0 06	−1 55		1 24	10 17 27 89	+9 26 65	+ 9 6
					p Carinæ	U	1	+0 0434	10 18 38 33	+0 05	−0 02	−1 55	+0 01	36 82	10 28 5 62	+9 28 80	
		19	*I P W*	E	Argûs	U	1	+ 0398	9 4 4 64	−0 05	+0 01	+ 60		6 0	9 14 8 16	+0 1 96	− 4 2
					908 Gr 72	U	5	−0 1514	9 21 4 18	−0 16	+0 02	+1 60	0 00	5 64	9 21 8 39	+0 2 75	
				W	981	U	5	−0 1810	10 7 57 96	−0 19	+0 02	−1 60		56 19	0 17 27 88	+9 31 69	− 7 1
				„	*p* Carinæ	U	11	+0 0434	10 18 37 15	−0 05	+0 01	−1 60	+0 0	35 52	10 28 5 62	+9 30 10	

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No. of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for: Collimation	Corrections for: Level	Corrections for: Pers. Equation Q	Corrections for: Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
NAGARKOIL (E) AND MANGALORE (W)	NAGARKOIL (Latitude 8°)	1888							h m s				s		h m	m s	d
				E	Argûs	U	1	+0 0398	9 14 4 88	+0 04	− 1	+1 55		6 46	9 14 8 5	+ 0 69	− 6 3
		Feb 20	*I P W*		908 Gr 72	U	5	−0 1514	9 21 3 78	+0 6	−0 02	+1 55	0 00	5 47	9 21 8 37	+ 0 2 90	
				W	981	U	5	−0 1810	10 7 55 02	+0 19	−0 02	−1 55		53 64	10 17 27 87	+ 9 34 23	− 7 6
					p Carinæ	U	1	+0 0434	0 18 34 58	+0 5	−0 1	−1 55	+0 2	33 09	0 8 5 62	+ 9 32 53	
				E	Argûs	U	1	0 0398	9 14 5 28	+0 09	−0 04	+1 55		6 88	9 14 8 14	+ 0 1 26	− 0 1
		21	*I P E*		908 Gr 72	U	5	−0 1514	9 21 5 28	+0 35	−0 10	+1 55	0 00	7 08	9 21 8 35	+ 0 27	
				W	981	U	5	−0 1810	10 7 52 46	+0 42	−0 1	−1 55		5 23	10 7 27 86	+ 9 36 63	− 5 1
					p Carinæ	U		+0 0434	10 18 3 59	+ 11	− 03	− 55	+ 02	30 14	10 28 5 63	+ 9 35 49	
				E	Argûs	U	1	+0 0398	9 14 6 02	+0 01	+0 03	+1 60		7 66	9 14 8 12	+ 0 0 46	− 1 4
		22	*I P E*		908 Gr 72	U	5	−0 5 4	9 2 5 90	+0 03	+0 08	+1 60	0 00	7 6	9 2 8 33	+ 0 0 72	
				W	981	U	5	−0 8 0	10 7 50 6	+0 4	+0 07	−1 60		49	1 17 27 84	+ 9 38 73	− 2 0
					p Carinæ	U	1	+0 0434	0 8 28 89	+0 01	+0 02	−1 60	+0 02	27 34	10 28 5 63	+ 9 38 29	
				E	Argûs	U	1	+0 0398	9 4 6 27	+ 09	+0 04	+1 55		7 95	9 14 8 09	+ 0 0 14	− 1 6
		24	*I P W*		908 Gr 72	U	5	−0 5 4	9 5 88	+0 3	+0 1	+ 55	0 00	7 85	9 21 8 30	+ 0 0 45	
				W	981	U	5	−0 1810	0 7 44 20	+ 38	+0 10	−1 55		43 3	0 17 27 82	+ 9 44 69	− 5 3
					p Carinæ	U		0 0434	10 18 23 55	+0 9	+0 03	−1 55	+0 02	22 14	10 28 5 64	+ 9 43 50	
	MANGALORE (Latitude 2 5)	1888															
				E	Argûs	U	9	+0 04 1	9 24 26 27	−0 05	−0 01	+1 65		27 86	9 14 8 6	− 10 19 70	−18 2
		Feb 18	*I P E*		908 Gr 72	U	4	−0 469	9 31 23 28	−0 2	−0 5	+1 65	0 00	24 68	9 21 8 4	− 10 16 27	
				W	981	U	2	−0 764	10 18 19 35	−0 20	−0 06	−1 65		1 44	10 7 27 89	− 0 49 55	−17 8
					p Carinæ	U	6	+0 0446	10 28 60 81	−0 06	−0 1	− 65	+0 1	59 1	0 28 5 62	− 0 53 48	
		19	*I P E*														−18 7*
		20	*I P W*	W	981 Gr 72	U	4	−0 1764	10 18 15 75	−0 09	+0 05	−1 62		14 09	10 7 27 87	− 0 46 22	−12 1
					p Carinæ	U	6	+0 0446	10 28 56 13	− 03	+0 01	−1 62	+0 02	54 51	10 28 5 62	− 0 48 89	
		21	*I P W*	W	981 Gr 72	U	3	−0 764	0 8 1 80	−0 09	0 00	−1 61		10 10	10 17 27 86	− 0 42 24	−19 2
					p Carinæ	U	8	+0 0446	10 28 53 74	−0 03	0 00	−1 61	+0 02	52 12	10 28 5 63	− 0 46 49	
		22	*I P W*	E	Argûs	U	8	+0 041	9 24 27 82	−0 02	+0 01	+1 61		29 42	9 14 8 12	− 1 21 30	−16 6
					908 Gr 72	U	5	−0 1469	9 31 24 96	−0 08	+ 02	+1 61	0 00	26 5	9 21 8 33	− 10 18 18	
				E	Argûs	U	8	+0 0411	9 24 27 75	−0 02	+0 0	+1 66		9 41	9 4 8 09	− 10 2 32	−16 3
		24	*I P W*		908 Gr 72	U	5	−0 1469	9 31 24 93	−0 08	+0 05	+1 66	0 00	26 56	9 21 8 30	− 10 18 26	
				W	981	U	3	−0 1764	10 18 4 09	−0 09	+0 06	−1 66		2 40	10 17 27 82	− 34 58	−15 5
					p Carinæ	U	8	+0 0446	10 28 45 29	−0 02	+0 01	−1 66	+0 02	43 64	10 28 5 64	− 0 38 00	

* No star observations were taken for the determination of the deviation correction: it had therefore to be deduced from the readings of two collimators, which were found on February 20th to have remained immovable since February 18th.

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No. of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Level	Pivot Equation Q	Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
		1888							h m s	s	s	s	s	s	h m s	m	d
MADRAS (E) AND MANGALORE (W)	MADRAS (Latitud 3 4)			E	945 Gr 72	U	5	−0 0682	9 48 19 17	+0 09	+0 02	−1 57		17 7	9 48 23 73	+ 0 6 02	−91 4
		Mar 5	*I P E*		947	U	11	+0 0180	9 51 23 11	+0 03	+0 01	−1 57	0 00	21 58	9 51 19 72	− 0 1 86	
				W	η A gûs	U	8	+0 4 5	10 19 35 05	+0 05	+ 1	+1 57		36 68	0 40 45 73	+ 21 9 05	−89 8
					Ursæ Majoris	U	8	−0 0366	0 35 35 76	+0 6	+0 02	−1 57	+0 1	34 28	10 56 50 34	+ 21 16 06	
				E	945 G 72	U	5	−0 0682	9 48 26 01	−0 0	+ 4	−1 56		24 48	9 48 23 69	− 0 0 79	−20 5
		7	*I P W*		947	U	1	+0 0 80	9 5 23 82	0 00	+0 0	− 56	0 00	22 27	9 5 9 7	− 0 2 56	
				W	η A gûs	U	8	+0 0415	0 19 3 16	00	+	+1 56		32 73	10 40 45 73	+ 21 13 00	−23 3
					Ursæ Majoris	U	8	−0 366	10 35 37 05	0 00	+0 03	−1 56	+ 01	35 53	10 56 50 35	+ 2 14 82	
				E	945 Gr 72	U	5	− 68	9 48 27 7	+0 14	+0 05	−1 57		25 89	9 48 23 67	− 0 2 22	−18 6
		8	*I P W*		947	U		+0 18	9 5 25 3	+ 04	+	− 57	00	23 52	9 5 9 7	− 0 3 81	
				W	η A gûs	U	8	+ 4 5	1 19 30 53	+0 07	+0 02	+ 57		32 9	0 40 45 73	+ 21 3 54	−25 5
					Ursæ Majoris	U	8	− 366	35 36 26	+0 09	+0 04	−1 57	+ 01	34 83	10 56 50 36	+ 21 15 53	
				E	945 G 72	U	5	− 682	9 48 28 81	+ 03	c 03	−1 56		27 3	9 48 23 65	− 0 3 66	−18 3
		9	*I P E*		947	U	1	+0 0 80	9 5 26 46	+0 02	+0 01	−1 56	0 00	24 93	9 51 19 69	− 0 5 24	
				W	η A gûs	U		+0 415	10 19 30 13	+	+0 01	+ 56		31 7	0 4 45 72	+ 21 4 1	−27 3
					Ursæ Majoris	U	8	−0 366	35 35 74	+0 01	+0 02	−1 56	+0 0	34 22	0 56 50 36	+ 21 16 4	
				E	945 G 72	U	5	− 0682	9 48 28 65	+0 09	+	−1 58		27 27	9 48 23 62	− 0 3 65	−27 5
		10	*I P E*		947	U	11	+0 0180	9 51 27 18	+0 03	+ 06	− 58	0 00	25 69	9 51 19 69	− 0 6 00	
				W	η Argûs	U	4	415	0 19 29 3	+0 05	+ 5	+1 58		30 81	40 45 71	+ 21 14 90	−32 5
					Ursæ Majoris	U	8	−0 0366	10 35 34 31	+0 06	+0 12	−1 58	+0 01	32 92	10 56 50 36	+ 21 17 44	
				E	945 Gr 72	U	5	−0 0682	9 48 30 05	−0 01	−0 05	−1 57		28 42	9 48 23 58	− 0 4 84	−25 4
		12	*I P W*		947	U	1	+0 0180	9 5 28 29	00	−0 02	− 57	0 00	26 70	9 51 19 67	− 0 7 03	
				W	η A gûs	U	7	+ 0415	10 19 26 64	0 00	−0 2	+1 57		28 19	10 40 45 71	+ 21 17 52	−32 1
					Ursæ Majoris	U	8	− 0366	10 35 3 95	−0 01	−0 04	−1 57	+0 0	30 34	0 56 50 37	+ 21 20 3	
	MANGALORE (Latitude 12 5)	1888 —		E	945 Gr 72	U	5	−0 0683	0 0 2 72	−0 22	−0 01	−1 63		0 86	9 48 23 73	− 21 37 13	+ 9 5
		Mar 5	*I P W*		947	U	0	+0 0179	10 12 57 74	−0 08	0 00	−1 63	0 00	56 3	9 5 19 72	− 21 36 31	
				W	η Argûs	U	0	+0 415	10 41 7 58	−0 13	0 00	+ 63		9 08	0 40 45 73	− 0 23 35	− 1 1
					Ursæ Majoris	U	8	−0 367	10 57 15 36	−0 13	−0 01	− 63	+	3 6	56 50 34	− 0 23 26	
				E	945 Gr 72	U	8	−0 0683	10 10 4 54	−0 22	−0 01	−1 63		2 68	9 48 23 69	− 21 38 99	+ 7 3
		" 7	*I. P W*	"	947 "	U	10	+0 0179	10 12 59 78	−0 08	0 00	−1 63	0 00	58 07	9 51 19 71	− 21 38 36	
		8	*I. P E.*		..												+10 4*

* No star observations were taken for the determination of the deviation correction: it had therefore to be deduced from the readings of two collimators, which were found on March 9th to have remained immovable since March 7th.

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No. of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pendulum Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
MADRAS (E) AND MANGALORE (W)	MANGALORE (Latitude 5)	1888							h m s			s			h m s	m s	d
				E	945 Gr 72	U	8	−0 0683	0 0 6 66	+ 8	− 08	−1 63		5 3	9 48 3 65	− 2 41 38	+ 8 8
		Mar 9	*I P E*		947	U		+0 179	0 3 1 95	+0 03	−0 04	− 63	0 00	0 3	9 5 9 69	− 2 40 62	
				W	η Argûs	U	6	+0 4 5	4 4 83	+0 5	−0 0	+ 63		6 49	0 40 45 72	− 0 20 77	+ 4 9
					Ursæ Majoris	U	8	−0 0367	0 57 13 14	+0 05	−0 06	−1 63	+0 01	11 5	10 56 50 36	− 0 21 15	
				E	945 G 72	U	8	−0 0683	10 10 6 80	+0 18	+0 4	−1 64		5 38	9 48 23 62	− 2 41 ,6	+ 2 7
		10	*I P W*		947	U	10	+0 0 79	0 3 2 78	+0 06	+0 0	− 64	0 00	2	9 51 19 69	− 21 41 53	
				W	η Argûs	U	9	+0 4 5	10 4 4 0	+0 10	+0 0	+1 64		5 85	0 40 45 71	− 0 2 4	− 5 2
					Ursæ Majoris	U	0	−0 0367	57 11 59	+0 10	+0 3	−1 64	+0 0	09	56 50 36	− 0 19 73	
		12	*I P W*	W	η Argûs	U		+ 04 5	10 4 8	+ 0	+0	+ 72		3 63	0 40 45 71	− 0 7 92	− 8 7
					Ursæ Majoris	U	0	−0 0367	10 57 9 18	+0 10	+0 04	−1 72	+0 01	7 6	10 56 50 37	− 0 7 24	
BELLARY (E) AND MANGALORE (W)	BELLARY (Latitude 15 9)	1888															
				E	η Argûs	U	8	+0 0420	10 40 44 46	+ 06	+0 03	+ 60		46 5	1 40 45 6	− 0 54	−25 8
		Mar 21	*I P E*		Ursæ Majoris	U	8	−0 0354	0 56 50 29	+0 5	+0 09	−1 6	+ 4	48 87	56 5 33	+ 1 46	
				W	λ Draconis	U	8	− 534	6 34 5	+ 7	+	+1 6		36 9	24 47 28	+ 8 10 99	−21 7
					1070 Gr 72	U	1	+0 0190	1 19 20 04	+0 03	+0 05	+1 60	0 00	21 7	1 27 3 4	+ 8 9 42	
				E	η Argûs	U	8	+0 0420	10 40 4 99	+0 06	+	+ 6		4 66	4 45 59	+ 2 93	−24 5
		22	*I P E*		Ursæ Majoris	U	8	− 354	56 46 97	+ 5	+ 3	− 60	+0 4	45 49	56 5 3	+ 4 83	
				W	λ Draconis	U	8	−0 0534	16 33 86	+0 07	+ 03	+1 60		35 56	11 24 47 27	+ 8 11 71	−22 8
					1070 Gr 72	U	11	+ 0190	11 9 19 44	+0 03	+0 1	+1 60	0 00	21 08	11 7 31 14	+ 8 0 06	
				E	η Argûs	U	8	+0 042	1 40 37 02	+ 06	+ 06	+ 65		38 79	40 45 58	+ 6 79	−24 2
		23	*I P E*		Ursæ Majoris	U	8	− 354	10 56 43 5	+0 05	+0 4	−1 65	+0 5	4 64	10 56 5 30	+ 0 8 66	
				W	λ Draconis	U	8	− 534	1 6 33 08	+0 07	+0 6	+1 65		34 96	11 24 47 26	+ 8 12 3	−24 6
					1070 Gr 72	U		+0 0190	11 19 18 86	+0 03	+0 08	+1 65	0 00	20 62	1 27 3 14	+ 8 10 52	
				E	η Argûs	U		+0 0410	10 40 35 18	+0 09	00	+1 62		36 89	10 40 45 56	+ 0 8 67	−81 9
		24	*I P W*		Ursæ Majoris	U	8	−0 0354	10 56 36 77	+0 09	−0 1	−1 62	+0 05	35 28	10 56 50 29	+ 0 15 0	
				W	λ Draconis	U	5	−0 0534	1 16 29 68	+0 12	−0 01	+ 62		31 4	11 24 47 25	+ 8 15 84	−81 4
					1070 Gr 72	U		+ 0 90	11 19 19 52	+0 05	0 00	+ 62	0 00	21 19	11 27 31 14	+ 8 9 95	
		25	*I P W*	W	λ Draconis	U	1	−0 534	11 16 30 80	+0 12	0 00	+1 63		32 55	11 24 47 24	+ 8 14 69	−53 5
					1070 Gr 72	U	7	+0 0190	11 19 18 63	+0 5	0 00	+1 63	0 00	20 31	11 7 31 13	+ 8 1 82	
				E	η Argûs	U	1	+0 0420	10 39 25 52	0 00	−0 01	+1 63		27 14	10 40 45 52	+ 1 18 38	−69 1
		26	*I P W*		Ursæ Majoris	U	8	−0 0354	10 55 28 13	0 00	−0 02	−1 63	+0 05	26 53	10 56 50 26	+ 1 23 73	
				W	λ Draconis	U	8	−0 0334	11 16 29 54	0 00	−0 02	+1 63		31 15	11 24 47 22	+ 8 16 07	−70 9
					1070 Gr 72	U	11	+0 0190	11 19 18 57	0 00	−0 01	+1 63	0 00	20 19	11 27 31 13	+ 8 10 94	

Arc	Station	Astronomical Date	Instrument and Pattern	Clock used	Star			D t (t t A	Observed Time of Transit	Coll	Level	F l t Q	Approx Clock Rate	Corrected Time of Transit	R.A. (I rea d l y 121 r f Low (l t)	Apparent Clock Corrections	Deduced Value of Deviation Correction a
BELLARY (F) to MANGALORE (W)	BELLARY (L t t d 5 9)	1888							h m						h m	m	d
				F	η A gû	U	8	4	4 3	− 4	− (	(4		9	4 45 5	+ 0 3 6	−51 6
		M 27	I P E		L œ M J	L	8	− 355	56 4 4	− 4	− 8	− (4		((	5(5 5	+ 0 27 5)	
				W	λ D	L	8	− 34	(3 8	− (	−	+ (4		3 5(	1 24 47 2	+ 8 4 65	−5 9
					10 0 G 72	L	5	)	) 8	−	− 9	+ 64		4	27 3 3	+ 8 8)	
	MANGALORE (L t t d)	1888															
				E	η A g\	U		4 5	49 3 3	+ 5	−	+ 3		4 8	4 4 (	− 8 9)	− 6 4
		M 1	I P E		L œ M J	L	8	− 3(	5 6)	+	− 3	− 3	+ 4	9	5(5 33	− 8 8 ()	
				W	λ D	U	8	− 548	24 54 88	+ 7	− 5	3		5((3	4 4 8	− 9 5	− 7 5
					10 0 (2	U	8	8	7 3)	3	− 3	3		4 4	7 3 4	−))	
				W	λ D	L	4	− 48	4 54	+	− 5	+ 4		55 9	4 47	− 8 ()	− 8 9
			I P F		10 0 G 2	U		+ 8	7 38 4	3	− 3	+ 4		4 48	7 3 4	− 0) 34	
		3	I P J	W	λ D	U	8	− 48	4 53	+ 7	+			55 5	24 4 6	− 8 4	− 7
					10 0 (	L		+ 8	27 38 3	+ 3	+	+ 72		3) 8)	1 7 31 4	− 8 75	
		24	I P E														− 5 *
			I P B	W	λ D	(	8	45	4 5 94	+ 5		7		54 8	4 47 4	− 7 58	− 5
					1( ) (	U		8	3 3	6				3))	3 4	− 7 95	
				E	η A g\	L	7	4	48 4 5			72		44 33	4 45 5	− 7 58 8	−1 0
		26	I P W		L a M J n	L	8	− (	4 4) 8(	+		− 2	+	48)	5(5 (	− 7 58 3	
				W	λ D	(	8	− 48	4 5 5	5	−			54 3	4 47	− 7	− 5 8
					10 0 G 7	L		8	7 3(88	+ (		+	00	38 ((	2 3 3	− 7 53	
				E	η A gûs	U	8	4	48 37)	+	−	+ 3		3) (	4 45 5	− 7 54	− 7 9
		27	I P W		L sæ M J n	U	7	− 3(	4 45 35	+	− 4	− 3	+ 5	43 73	5(5 5	− 7 53 48	
				W	λ D	U		− 548	4 53 8	+0 5	− 3	3		54)3	24 47	− 7 2	− 1 5
					10 0 G 2	L	9	+ 8	3 9	+ 6	−	+ 3		38)(	27 3 3	− 7 83	
MANGALORE (E) AND BOMBAY (W)	MANGALORE (L t t 5)	1888															
		Ap 4	I P W	E	λ Dra	U	0	− 48	4 49 3	+ 6	− 0	− 88		4 5	4 47 8	− 0 0 4	− 7
					10"0 G 72	U		0 8	27 33)	+ o(	0	− 88		3 9	27 3	− 0 0 98	
		7	I P W	E	λ Dra	U		− 548	4 47 97	+ 6	3	+ 7		4) 8(	4 4	− 0 2 84	− 8
					10"0 G 72	U	1	+ 8	7 3 5	+ 06	0	7	00	4 53	27 3	− 0 3 43	
		8	I P E	E	λ Dra s	L		−0 0548	1 4 4 5	6	+ 09			49 38	11 24 4(9)	− 2 3)	− 6
					10 0 G 72	L	2	0 8	27 3 3	+0	+ (	7	00	33 9	7 3)	− 8	

* No star observation were taken for the determination of the deviation correction; it had therefore to be deduced from the readings of two collimators, which were found on March 25th to have remained immovable since March 23rd.

Arc	Stat	Astro mical Date	Instrum ntal P t	Clock use	Sta	C l n t n	N f W re Obs rved	D a t Co ta t A	Ob d Tim f Tra t	C e t n for: C ll m t	L l	Pen Eq t n Q	Appro imat Cl k R te	Seco d f C rre ted T m f Tra t	R g t Asce (I reased by 12 h rs f Low Culmin ti)	Apparent Clock C rrect ns	Ded d V l f D t n C rrecti
MANGALORE (E) AND BOMBAY (W)	BOMBAY (Latitud 8 54)	1888							h m		s	s	s		h m s	m	d
				W	λ Draconis	U	8	− 5 8	4 43 7	− 6	− 5	+ 67		45 8	24 47 08	+ 0 9	+ 38
					1070 Gr 72	U	1	+ 201	1 27 24 93	−0 05	−0 6	+ 67	0 00	26 5	27 3 1	+ 0 4 6	
		Ap 4	*I P W*		1191	U	5	−0 95	48 6	−0 9	−0 3	+ 67		2 78	2 48 20 0	− 0 2 78	
					1192	U	5	− 955	48 29 63	− 9	− 3	+1 67		3 8	2 48 27 68	− 0 3 12	+ 34 6
					Polaris	L	2	+0 9488	3 6 22 8	+0 90	+ 2	−1 67	−0 09	22 97	3 16 59 67	+ 0 36 7	
				W	λ Draconis	U	8	− 0508	24 56 78	−0 7	+0 2	+1 66		58 49	1 24 47 0	− 0 47	+ 44 6
					1070 G 72	U		+ 020	27 37 73	− 3	+0 05	+ 66	00	39 4	27 3	− 8 3	
		7	*I P W*		1191	U	5	− 957	48 35 5	−	+0 25	+ 66		37 2	2 48 9 95	− 0 17 25	
					1192	U	5	−0 955	2 48 42 52	−0 21	+0 25	+1 66		44 2	2 48 27 6	− 0 6 60	+ 39 2
					P l s	L	2	+ 9488	3 6 3 9	+1 00	−0 83	−1 66	−0 09	3 33	3 6 59 3	+ 0 27 98	
				W	λ Drac ni	U	8	−0 5 8	24 59 96	− 2	− 3	+ 6		6 34	4 46 99	− 14 35	+ 2 6
					1070 G 72	U	1	+0 02	1 27 43 03	−0 08	−0 0	+ 6	0 00	44 55	27 3 9	− 13 46	
		8	*I P E*		1191	U	5	−0 957	2 48 34 54	− 62	− 5	+1 6		35 48	2 48 9 93	− 0 5 55	
					1192	U	5	− 955	48 42 49	− 6	−0 05	+1 6		43 43	48 27 60	− 5 83	+ 3 9
					I olaris	L	2	+0 9488	3 7 9 2	+2 89	+0 8	−1 61	−0 09	57	3 6 59 26	− 0 11 3	

Between Colonels Strahan and Heaviside

By S ars of	Observed with Telescope No 2									Observed with Telescope No 2					
	At MADRAS (Lat t d 3 4)									At NAGARKOIL (Lat t d 8 1)					
	Nov mbe 30 1887			D b 1887			D b 3 1887			J y 7 1888			J y 28 1888		
	Star	Decl at	Eq t S−H	Star	Decl at	Eq t S−H	Star	Decl at	Eq t S−H	Star	Decl at	Eq t S−H	Star	Decl at	Eq t S−H
North Aspect	502	+ 4 1	−	644	+ 2 6	+ 4	691	+ 3 5	00	1563	+ 9 39	−	1023	+ 26 4	+ 0
	524	+ 5 3	− 3	666	+ 5 4	−	61	+ 38 38	+ 8	160	+ 38	−	1040	+ 27 12	− 4
	533	+ 9 30	− 8	68	+ 4	+	771	+ 7	+ 4	1(4	+ 3	− 4	1052	+ 4 19	− 06
	572	+ 8 44	− 04	691	+ 3 5	+ 4	80	+ 4 3	+ 1	1(1	+ 9 4	−	1064	+ 8 22	00
	691	+ 32 5	− 7	761	+ 38 38	−	861	+ 8 4(	− 3	16 8	+ 8 5	−	1079	+ 6 23	− 01
	761	+ 38 38	− 7	771	+ 7	+ 5	872	+ (47	+ 3	1671	+ 7 7	− 9	1092	+ 9	− 3
	780	+ 4 32	−	780	+ 4 3	00	901	+ 7 5	0	1723	+ 32	− 03	1140	+ 19 19	− 01
	861	+ 8 46	+	811	+ 8 46		913	2 3	+ 2	174	+ 3 58	− 5	1157	+ 24 1	− 06
	872	+ 26 4	− 0	8 2	+ 6 47	−	96	+ 7 7	− 9	18 1	5 47	− 8	1167	+ 24	− 08
				901	+ 7 5	+	977	+ 8 5	+ 4	1837	+ 4 3	− 9	1678	+ 28 5	− 02
				913	+ 3	− 3	989	+ 26 5	00	1851	+ 9 5	− 2	1671	+ 7 8	− 04
				966	+ 7 7	−	1045	+ 2	−	1876	20 5	− 8	1723	+ 32 7	− 04
				977	+ 8 57	−	1055	+ 2 38		188	+ 8 55	−	1742	+ 3 58	− 02
				983	+ 26 5	− 5	1064	+ 18	+ 06	1 9 5	+ 3		1821	+ 5 47	+ 02
										1986	+ 9 49	− 07	1837	+ 24 3	− 05
													18 1	+ 9 50	− 02
													1876	+ 20 15	− 03
													1882	+ 28 55	− 04
	Mean $(S_N - H_N)$		− 47			+ 0 006			+ 0			− 06			− 0 034
South Aspect	561	+ 9	+	625	+ 2 5	7	704	− 6 57	+ 06	1 88	− 5 4	+ 0	991	+ 6 4	+ 0 0
	684	+ 8	+ 7	639	− 5	+ 8	720	− 3 30	+ 4	1537	− 8 54	− 5	1005	− 3 4	+ 10
	704	− 6 57	+	704	− 6 57	+ 6	741	+ 9 3	+ 3	1611	+ 2 44	+	1016	− 9 34	− 02
	720	− 3 3	+	720	− 3 3	+ 06	5	+ 0 3	+ 7	1638	− 6 58	− 5	1104	− 22	+ 0
	741	+ 9	+	741	+ 9	−	783	+ 6 59	+ 5	1708	− 1	−	111	− 7 50	− 03
	755	+ 10 3	+ 04	75	+ 3	+ 3	807	− 3 53	+ 04	171	− 5	− 4	1124	− 5 59	+ 01
	789	+ 6 59	+ 0	789	+ 6 59	− 5	81	−	+ 5	1765	− 6	− 4	1134	− 5 34	− 03
	807	− 3 53	− 2	807	− 3 53	+ 06	830	+ 6	+ 06	1775	− 8 4(	+ 02	1708	−	− 02
	815	− 12 2	+ 06	815	− 2 2	− 03	844	+ 59	+ 06	1802	− 34 8	− 7	1 1	− 0 5	− 3
	830	+ 0 16	+ 02	830	+ 10 6	00	891	+ 6	+ 06	1812	− 3 35	−	1765	− 6	−
	844	± 11 59	+ 06	844	+ 11 59	+ 01	929	+ 8 27	+ 0	1860	− 23	− 4	1775	− 28 46	+ 4
				891	+ 6 0	+ 01	943	− 3 20	+ 05	1901	− 14 12	− 4	1802	− 34 8	+ 08
				943	− 3 20	+ 07	952	− 8 8	+ 05	1922	− 35 8	−	1812	− 3 35	+ 5
				929	+ 8 27	00	1005	− 30 14	+ 5	1941	− 33 55	− 5	1860	− 23	+ 05
				952	− 8 8	− 01	1016	− 9 34	+ 08	1959	− 14 56	− 05	1901	− 14	+
							1028	+ 2 57	+ 2				1922	− 35 8	−
													1941	− 33 55	+ 5
	Mean $(S_S - H_S)$		+ 0 035			+ 0 023			+ 0 049			− 0 36			6

 TABLE III ABSTRACT OF OBSERVED VALUES OF PERSONAL EQUATION

Between Colonels Strahan and Heaviside

By St	Observed W 1 L 1 N 2 — At Bombay (I t t 1 8 54) — April 1 1888 — Sta	D 1 t		Eq t S − H	April 1 1888 — St	D 1 t		Eq t S − H
	3 10	+ 8	34	− 0	3 10	+ 28	34	− 2
	3 3	+ 6	5	−	3 3	+ 26	5	− 05
	3751	+ (	6	− 01	3 1	+ 6	6	− 09
	377(	+ 2	47	− 8	3 76	+	47	− 6
	3797	+ (	9	− 4	3 97	+ 6	9	− 3
	3809	+ 5	6	− 5	3809	+ 25	6	− 2
	3842	+ 23	42	− 8	38 1	+ 3		− 4
N	38 1	+ 3		− 3	391	+)		− 8
	3915	+ 9		− 3	3937	+ 8	4	− 4
	3937	+ 8	24	− 8	3 5	+ 44	5	+ 4
	3 2	+ 44	5	− 1	3964	+ 1	59	− 05
	3964	+ 2	5)	− 5	3 90		5	− 3
	3 90	+	5	−	3 98	+ 35	33	−
	3998	+ 35	33	− 8	4010	+ 38	3(	−
	4010	+ 38	36	− 2	4018	+ 41	33	+ 05
	M (S$_N$ − H$_N$)			− 48				− 3
	3 0	+ 4		− 0 4	3696	+ 6	56	− 0 3
	3 (1	+	8	− 4	3 20	+ 4	1	+
	3 85	+ 4	4	−	3 (1	+ 2	8	+
	3824	+ 5		− 08	3 8	4	4	− 3
	3832	+	3	− 7	38 4	+ 5	0	− 7
	38(2	+ 6	39	− 07	383	+ 0	32	− 3
	38 3	+	45	00	38(	+ 6	39	00
	3886	+ 17	4	− 3	38 3	+	45	+ 4
S T R A T	3900	+ 3	8	00	3886	+ 7	4	−
	3932	+ 7	25	− 5	3900	+ 3	8	+ 4
	39 1	+ 5	22	− 0	3932	+ 7	25	− 05
	3975	− 6	3	− 04	3971	+ 5	22	+ 04
	4030	− 4	31	− 5	397	− 6	3	−
	4039	+ 4	6	+ 03	979	+ 8	53	+ 3
	4049	+ 4	7	− 01	4030	− 4	3	− 0
	4063	− 4	51	+ 03	4039	+ 4	6	− 01
	4077	− 2	30	− 03	4049	+ 4	7	− 09
	Mea (S$_S$ − H$_S$)			− 0 034				− 0 0 5

Between Colonels Strahan and Heavıside

St ion	By Stars of N rth Aspect				By S rs of South Aspe t			
	Astro omical Date	Telescope in us	Valu f tl e Equat Mean $S_N - H_N$	G l M $S_N - H_N$	Astro m c l D t	T le pe use	V l of tl Eq ation Mean $S_S - H_S$	G ral M $S_S - H_S$
MADRAS	1887				1887			s
	N mber 30	N 2	− 47		N b 30	N 2	+ 035	
	D c mbe 2	2	+ 6	−	Dec b 2	2	+ 023	+ 0 036
	3	2	+		3	2	+ 49	
NAGARKOIL	1888				1888			
	Janua y 27	No 2	− 0 6	− 047	J ry 27	No 2	− 0 36	− 0 010
	28	2	− 34		28	2	+ 6	
BOMBAY	1888				1888			
	April 12	No 2	− 0 048	− 0 039	April 12	N 2	− 0 34	− 0 25
	13	2	− 3		13	2	− 0 5	

Final Values of the Equation Adopted

For the measurements Madras-Bangalore and Bangalore Nagarkoil executed between December 3 1887 and January 27 1888 the following values of the personal equations were adopted for the reductions *vi*

$$S_N - H_N = -0\ 029 \text{ and } S_S - H_S = +0\ 013$$

And for the measurements Madras-Nagarkoil Nagarkoil-Mangalore Madras-Mangalore Bellary-Mangalore and Mangalore-Bombay executed between January 28 1888 and April 12 1888 *viz*

$$S_N - H_N = -0\ 043 \text{ and } S_S - H_S = -0\ 018$$

In these equations the general symbol S − H signifies a quantity which must be added to times observed by Colonel Heaviside before they are compared with those observed by Colonel Strahan

OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL − ρ

MADRAS (F) L t 13° 4 Lo g 5 21 9ˢ AND BANGALORE (W) Lat 13° 1 Long 5 10ᵐ 30ˢ

Astronomical Date	Star: B A C N mb	Star: D l t	Star Asp t	Transits Observed at E, By St ha w th T le op No 2: I t m tal Po t on a d Corr t n C ta ts	Mean Ob rved T m	T tal C rre t	Second of Co r t d T m	Sta A pect	Transits Observed at W, By H nde w th T les p No 1: I t m t l I t d C t C ta t	M Ob l Time	T tal C c t	Seco d of Correct d T me	Diff ren e of Corr ct d T m (W − E): By ach St r	M f G p	Co rect n f Rate f E Cl k	Corr f P rsl Eq	ΔL − ρ
1887					h m					h							
Dec 13	1316	+ 21 8	N	I P E	4 11 46 02	+ 2 53	48 55	N	I P E	4 2 25 8	+ 2 57	27 85	39 30				
	1346	+ 7 5	N	d c + 3 6	16 29 8	+ 2 4	31 59	N	d − 2	7 1 84	− 0	83	39 24	= 9 6	− 003	− 9	39 28
	1370	+ 4 28	N	b + 8 − 7 6	20 7 4	+ 2 33	9 73	N	b + 5 a + 6	3 56 37	+ 2 6	58 98	39 25				
	1393	+ 13 29	N	Q + 2 14	24 19 76	+ 2 30	22 06	N	Q + 2 64	34 58 69	+ 2 6	61 31	39 25				
	1335	+ 3 36	S														
	1384	+ 12 48	S		4 22 34 46	+ 2 27	36 73	S		4 33 13 3	+ 6	15 93	1 39 20	= 39 237	− 003	+ 0 3	0 39 247
	1403	− 7	S		26 1	+ 89	1 9	S		36 48 5	+ 2 7	5 2	39 29				
	1418	− 7 4	S		8 48 47	+ 1 7	50 8	S		39 29 3	9	29 4	39 22				
	1475	+ 32 24	N	Q − 2 14	4 42 8 8	− 33	7 49	N	Q − 2 64	4 52 49 53	− 8	46 73	39 24	= 39 7	− 003	− 0 029	0 39 95
	1485	+ 5 42	N		43 24 65	− 90	22 75	N		54 4 62	− 2 68	1 94	39 19				
	1520	+ 32 59	N		49 46 44	− 1 30	45 4	N		5 0 37 2	− 2 8	24 39	39 25				
	1400	+ 10 56	S		4 38 18 48	− 2 5	6 43	S		4 48 58 9	− 65	55 64	0 39 2	= 39 88	− 003	+ 0 3	39 98
	1469	− 3 8	S		39 59 66	− 2 45	57	S		50 38 97	− 2 56	36 4	39 2				
	1495	+ 5 25	S		45 9 7	−	7 5	S		55 56 65	+	56 67	39 6				
	1507	− 5 38	S		47 29 15	− 2 52	26 63	S		58 8 35	− 2 54	5 81	39 8				
Dec 14	1316	+ 2 18	N	I P W	4 1 46 85	+ 2 04	48 89	N	I P E	4 22 25 90	2 45	28 35	10 39 46	= 0 39 440	− 0 004	− 0 0 9	10 39 407
	1370	+ 14 28	N	d c − 0 4	20 8	+ 2 2	20 03	N	d c − 2	30 56 95	+ 2 54	59 49	39 46				
	1393	+ 3 29	N	b − 4 0 − 6 1	24 20 41	2 03	22 44	N	b − 0 5 a + 31 0	34 59 29	+ 2 55	61 84	39 40				
				Q + 2 13					Q + 2 62*								

*Owing to the rreg l r rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00.

OF THE APPARENT DIFFERFNCE OF LONGITUDES, $\Delta L - \rho$

MADRAS (E) *Lat 13° 4 Lo g 5 21 9ˢ* AND BANGALORE (W) *Lat 13° 1 Lo g 5ʰ 10ᵐ 30ˢ*

Astronomical Date	Star: B A C Numb	Star: D l t	Transits Observed at E (By St h w th T l cope N 2): St A pe t	I trum tal P t d C t C t t	Mea Ob d T m	T tal C rec t	S d f C &t d l	Transits Observed at W (By H vis de w th T l cop N 1): Star A pect	I tru tal P ti d C t C ta ts	Mean Obs rved T me	T t l C c t	S d f C t d l	Diff re ce f Corre ted Tim s (W − E): By ach Sta	M f Group	Correct for Rat of E Clock	Corrns fo Persl Equati ns $S_E - H_E = -0^s\ 9$, $S_B - H = +0\ 0\ 3$	ΔL − ρ
1887					*h m*					*h m*		*s*	*m*				
D 14	1335	3 36	S	*I P W*	4 4 36 05	+ 2 3	38 08	S	*I P E*	4 5 14 94	+ 2 57	17 5	39 43				
	1384	+ 2 48	S	*d* − 4	34 98	+ 2 04	37 02	S	*d* − 2 2	33 3 95	+ 2 56	16 51	39 49	39 433	− 0 004	+ 0 0 3	0 39 44
	1403	− 0 7	S	b − 4 − 6	6 3	2 3	35	S	b − 5 3	36 48 99	+ 72	5 71	39 36				
	1418	− 7 4	S	Q + 13	28 48 60	+ 98	50 58	S	Q + 62	39 29 85	+ 0 18	3 03	39 45				
	1475	+ 32 24	N	Q − 2 3	4 42 10 04	− 2 18	7 86	N	Q − 2 62*	4 52 47 59	− 0 34	47 25	0 39 39				
	148	+ 15 4	N		43 5 6	− 2 3	23 03	N		54 58	− 09	2 49	39 46	9 4 3	− 0 004	− 0 029	0 39 380
	1520	+ 32 59	N		49 47 68	− 8	45 50	N		5 7 86	− 2 97	24 89	39 39				
	1469	− 3 8	S		4 39 59 89	− 2 7	57 6	S		4 50 36 87	0 4	37 1	39 39				
	1495	+ 5 25	S		45	− 2 5	, 85	S		55 59 87	− 59	57 8	39 43	39 397	− 004	+ 0 3	0 39 406
	1507	− 5 38	S		47 29 27	− 7	27 00	S		58 8 82	− 45	6 37	39 37				
Dec 17	1316	+ 2 8	N	*I P W*	4 1 48 29	+ 2 23	5 52	N	*I P W*	4 2 27 56	+ 2 33	9 89	0 39 37				
	1346	+ 7 5	N	*d* − 4	6 3 33	+ 9	33 52	N	*d* c + 4	7 5	+ 43	94	39 4	39 4	− 0 004	− 0 029	1 39 387
	1370	+ 14 28	N	b + 4 − 22 1	20 19 49	+ 2 7	21 66	N	b − 3 7 + 58 5	3 58 59	+ 2 49	61 08	39 42				
	1393	+ 13 29	N	Q + 2 3	24 21 83	+ 2 15	23 98	N	Q + 2 6*	35 0 93	+ 2 52	3 45	39 47				
	1335	+ 13 36	S		4 14 37 54	+ 2 15	39 69	S		4 25 6 58	+ 5	9	1 39 41				
	1384	+ 12 48	S		22 36 45	+ 2 5	38 60	S		33 15 55	+ 2 55	8	39 5	0 39 448	− 0 004	+ 3	10 39 357
	1403	− 0 17	S		26 11 83	+ 2 14	13 97	S		36 50 47	+ 84	53 3	39 34				
	1418	− 7 4	S		28 5 5	+ 1 99	52 14	S		39 28 68	+ 3 00	3 68	39 54				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off and consequently in these cases Q = 0 00

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

MADRAS (E) Lat 13° 4 Long 5 21 9 AND BANGALORE (W) Lat 13 1 Long 5h 10m 30s

Astronomical Date	Star: B A C No.	Star: Decl.	Transits Observed at E (By St with Telescope No 2): Aspect	Instrument Position and Corrections Constants	Mean Observed Time	Total Corr.	Seconds of Corrected Time	Transits Observed at W (By H with Telescope No 1): Aspect	Instrument Position and Corrections Constants	Mean Observed Time	Total Corr.	Seconds of Corrected Time	Diff. of Corrected Time (W − E): By each Sta	Mean of Group	Corr. for Rate of E Clock	Corrn for Personal Equation $S_W - H_E = -0.9$, $S_E - H_W = +.3$	ΔL − ρ
1887					h m		s			h m			m				
Dec 17	1453	+ 23 53	N	I P W	4 36 33 97	−2 00	31 97	N	I P W	4 47 4 37	− 96	41	39 44	m 39 433	− 004	− 9	39 400
	1475	+ 32 4	N	d − 4	42 46	−2 2	9 44	N	d + 4	52 52 13	−3 2	48 9	39 48				
	1485	+ 5 42	N	b + 4	43 26 84	−2 08	24 76	N	b − 3 7 a + 58 5	54 6 86	−2 7	4 1	39 35				
	1520	+ 32 5	N	Q − 2 3	49 49 0	−1 9	47 0	N	Q − 2 6	5 0 29 78	−3 22	26 56	39 46				
	1460	+ 56	S		4 38 20 58	−2 2	18 46	S		4 48 6 46	−2 63	57 83	39 37	m 39 383	− 0 004	+ 3	39 39
	1469	− 3 28	S		39 61 46	−2 24	59 22	S		50 4 95	−2 3	38 65	39 43				
	1495	+ 5 25	S		45 2 68	−2 6	9 5	S		55 6 37	−2 5	58 86	39 34				
	1507	− 5 38	S		47 30 90	−2 26	28 64	S		58 29	−2 26	8 03	39 39				
Dec 19	1393	+ 3 29	N	I P E d − 4 b − 3 3 + 5 6 Q + 2 14	4 24 23 0	+2 2	25 03	N	I P W d + 4 b + 33 3 Q + 62	4 35 55	+2 6	4 7	39 4	m 39 40	− 003	− 9	39 08
	1403	− 0 17	S		4 26 12 92	+2 06	4 98	S		4 36 5 23	+ 8	54 03	39 5	m 39 5	− 003	+ 0 03	39 06
	1453	+ 23 53	N	Q − 2 4	4 36 35 24	−2 28	32 96	N	Q − 2 62	4 47 4 84	−2 6	08	0 39 2	m 0 39 50	− 0 003	− 29	0 39 8
	1475	+ 32 4	N		42 2 7	−2 3	4	N		52 52 49	−2 9	49 59	39 9				
	1485	+ 5 42	N		43 27 93	−2 27	25 66	N		54 7 45	−2 65	4 80	39 14				
	1520	+ 32 59	N		49 50 38	−2 31	48 07	N		5 0 30 13	−2 91	27 22	39 15				
	1460	+ 10 56	S		4 38 21 66	−2 24	19 42	S		4 48 61 11	−2 58	58 53	10 39 11	m 10 39 1 3	− 0 003	+ 0 013	10 39 23
	1469	− 3 28	S		40 2 4	−2 2	0 20	S		50 41 7	−2 40	39 3	39 0				
	1495	+ 5 25	S		45 22 73	−2 23	20 50	S		55 62 11	−2 51	59 60	39 10				
	1507	− 5 38	S		47 31 78	−2 21	29 57	S		58 11 08	−2 37	8 71	39 14				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

MADRAS (E) *Lat 13° 4′ Lo g 5 21ᵐ 9ˢ* AND BANGALORE (W) *L t 13° 1 L ng 5 10ᵐ 80ˢ*

Astronomical Date	Star: B A C N b	Star: D l at	Transits Observed at E (By St ah th T l p N 2): Sta A p t	I t t l l t d C rr t (t t	M Ob r d T	T tal C rec t n	S d f C ct d T m	Transits Observed at W (By H and w th T l p N 1): Star A p t	I t t l l t d C t (t t	M n Observ d T e	T t l C t	S l f C t d l	Diff f Co t d l (W − E): By h Star	M a f G p	C rrectio f Rate f E Clock	C rrn f P rsl Eq t	ΔL − ρ
1887					h m s	s				h m			m				
Dec 29	1651	+ 9 4	N	*I P F*	5 4 24 47	+2 4	6 5	N	*I P E*	5 25 3 25	+2 6	5 86	0 39 35				
	16 8	+ 8 5	N	*d* − 3 4	6 6	+ 8	4 4	N	*d* − 2	27 8	5(	3 43	3))	39 8	+ 8	− 0 029	1 39 59
	1671	+ 7 17	N	b − − 9 5	7 58 4	+2 03	(7	N	b 5 5	28 3(85	+ 6	3) 46	39)				
	1689	+ 16 36	N	Q + 2 4	19 42 24	+2 03	44 7	N	Q + 2 63	3 2 95	+ 6	3 55	39 8				
	1611	+ 2 44	S		5 7 3 5	+2	33 6	S		5 8 9 5)	+2 64	2 23	39 7				
	1624	+ 3	S		9 55 66	+2 4	57 0	S		34 3	+ (	36 9	3)	19 220	+ 8	+ 0 3	39 34
	1638	− 6 58	S		5 5	+ 99	7 4	S		53 66	+ 65	56 3	3)				
	1837	+ 4 3	N	Q − 2 14	54 7	−2	5 49	N	Q − 2 63	5 52 57 29	−2 68	54 61	39	39	+	− 9	39 09
	1765	− 1 17	S		5 30 41 0(	−2 9	38 77	S		5 4 2 57	− 6	7 95	0 39 8				
	1851	+ 9 5	S		43 6 61	− 25	59 36	S		54 4 7	−2 63	38 54	39 8	39 80	+ 8	+ 0 3	39 94
Dec 30	1651	+ 19 42	N	*I P E*	5 14 24 37	+2 10	26 47	N	*I P E*	5 25 3 (	2 54	5 70	10 39 23				
	1608	+ 8 5	N	*d* − 4	6 95	+ 2	4 5	N	*d* − 2	7 93	+2 44	3 37	39 2				
	1671	+ 17 7	N	b − 4 9 − 6 8	7 58 04	2 07	6	N	b 6 +2 4	28 36 75	+ 56	39 3	39	0 39 13	+ 8	− 29	0 39 5
	1689	+ 16 36	N	Q + 2 17	19 4 3	+2 07	44 2	N	Q + 2 63	30 20 9	+2 57	13 48	39 28				
	1611	+ 2 44	S		5 7 31 00	+1 92	32 92	S		5 8 9 40	+2 68	12 08	10 39 16				
	1624	+ 11 3	S		9 5 55	+2	57 56	S		2 34 9	+ 6	3(8	39 4	39 2 3	+ 8	+ 3	39 17
	1638	− 6 58	S		12 15 1	+ 8	16 92	S		22 53 33	+2 76	5(09	39 7				
	1708	− 0	S		21 56 84	+ 7	58 61	S		3 35 2	+2 8	37 93	39 32				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK AND DEDUCTION

OF THE APPARENT DIFFERENCE OF LONGITUDES ΔL — ρ

MADRAS (I) L t 13 4 L g 5 21 9 AND BANGALORE (W) L t 13° 1 L g 5 10 30

Astron m cal D t	Star: B A C N b	Star: D t	Transits Observed at E (By St h th T l p N 2): St Apt	I t t l C t	M Ob l T	T t l C t	S c l f C rr t d I	Transits Observed at W (By H ud with T l p No 1): St Apt	I t t l C t	M Ob d T	Tot l C t	S d f C t d T m	Diff c f C rr t d T m (W − E): By 1 Star	M f G p	C rr t f R t F Cl k	C f 1 1 Eq t $S_N - H = - 0$ $S_S - H = + 0$	ΔL − ρ
1887					h		s			h m			m				
D 30	1 4	+ 3 (	N	I P T	5 3 35 68	−2 2	33 4	N	I P F	5 43 5 34	− 6	58	39 11	m 39 35	+ 8	− 9	39
	1810	+ 16 2	N	d − 4	38 35 24	−2 3	32 94	N	d −	49 4 7	− 69	2 8	39 4				
	18 1	+ 5 4	N	1 − 4) − 6 8	4 8 6	−2 9	25 87	N	1 + (+ 4	5 7 7	− 68	5 3	3) 6				
	1837	24 3	N	Q − 7	42 , 63	−2 8	5 45	N	Q − 2 63	52 5 3(	−2 78	54 58	39 3				
	1 43	+ 3 4	S		5 28 3 38	−2 4	29 97	S		5 39 59	−2 59	9	39 3	m 39	+	+ 3	39 9
	1 66	− 1 7	S		3 4 4	− 4(	38 68	S		4 2 3	−2 55	7 6	39 8				
	18 1	+ 9 5	S		43 6 64	−2 35	59 9	S		54 4 0	− 64	38 43	39 4				
	1860	− 23	S		45 22 64	−2 68	9 9(	S		5 6 48	−2 35	59 13	39 7				
1888																	
I 2	1671	+ 7	N	I P H	5 1 57 8(	+2 0	59 96	N	I P W	5 8 4 58	− 9	39 39	39 43	m 39 4	8	− 9	39 396
	1680	+ 6 36	N	l − 4 1 − (− 2	9 4	+	44 3	N	d −8) b −85 −67 7	30 4 75	−	3 55	39 4				
				Q + 2 8					Q + 2 63								
	1611	+ 2 44	S		5 7 30	+2 1	32 8	S		5 8 3 62	−1 37	2 25	39 43	m 39 39	000	+ 0 3	39 4 3
	1708	− 2 0	S		21 56 57	+2 11	58 68	S		32 39 72	−1 69	38 03	39 35				
	1910	+ 16 2	N	Q − 2 8	5 38 35 04	−2 6	3 8	N	Q − 2 63	5 49 18 76	−6 46	2 30	1 39 52	m 39 467	0 000	− 0 029	39 438
	18 1	+ 5 4	N		4 27 99	−2 26	25 73	N		5 11 64	−6 47	5 7	39 44				
	1837	+ 24 3	N		42 7 55	−2 4	15 3	N		52 61 4	−6 9	54 75	39 44				
	1713	+ 3 4	S		5 28 32	−2 25	29 85	S		5 39 15 88	−6 6	9 27	0 39 42	m 39 4 7	0 000	+ 0 03	0 39 44
	18 1	+ 9 5	S		43 6 38	− 4	59 4	S		54 45 10	−6 53	38 57	39 43				
	1860	− 3	S		45 2 9	−2 27	9 9	S		55 66 63	−7 8	59 35	39 43				

OF THE APPARE\T DIFLERL\CE OI LO\CITUDES $\Delta L + \rho$

MADRAS (E) *L t 13 4 L g 21 9* A\D BA\(ALORE (W) *L t 13° 1 I g 5 10 30*

A tro 1 D te	Star		Transits Observed at E *By St h w th T l , \ 2*					Transits Observed at W *B, H l th T l , \ 1*					D ff (t l l (W − 1)		C rrect f R t f W Clock	C rr f P rsl Eq − H = − E − H =	ΔL + ρ
	B A C N mb	D l t	A p t	I t l C t t	M Ol d l	T t l C t	S d f C t l l	A pect	I t l C t t	M Ol d l	T t l C t	S d f C t l l	By 1 St	M f (l			
1887					*h*					*h m*							
D 14	160	+ 38 2	N	*I P W* *d* − 4 b − 4 − 6 Q + 3	4 55 56 46		58 56	N	*I P W* *d* − l − 5 3 Q + 6	5 6 36	2 8	8 8	39 6	9 6	− 1	− 0 9	0 39 466
	1597	− 8 54	S		4 53 5 8	+ 98	9 85	S		5 4 36	8	39 5	39 67				
	1611	44	S		5 36 8	+ 2	38 8	S		8 5	68	8 4	39 (	9 663			39 5
	16 4	+ 3	S		5 3	+ 3	3 4	S		4 48	58	43 6	39 ((		− 1	+ 0 3	
	1638	− 6 58	S		)	+ 98	2 77	S		1 5) 69	8	6 49	39				
	1774	+ 3 6	N	Q − 13	5 4 73	− 4	39 4)	N	Q − 2 6	5 33 22	− 8	9 8	39 6)				
	1810	+ 6	N		8 4 34	−	3)	N		3) 1 47	− 2	8 75	39 (3	9 61		− 0 9	9 499
	1821	5 4	N		3 34 6	− 3	3 3	N		4 4 3)	−	68	39 (5		− 1		
	1837	+ 24	N		32 23 (	−	55	N		43 4	− 83	1)	39 (4				
	1 08	−	S		5 6 98	− 9	4 69	S		5 46 74	− 37	44 37	39 68				
	1715	− 5	S		3 42 7	− 3	9 8(	S		42 8	− 2	9 53	39 67	39 6		+ 0 3	9 38
	1743	+ 3 4	S		18 38 28	− 2	36 6	S		29 5 56	0	5 (	39 55		− 1		
	176	− 7	S		47 0	− 26	44 74	S		3 6 95	− 5	4 44	39				
Dec 17	160	+ 38	N	*I P W* *d* − 4 b 4 − 22 Q + 3	4 56 46 7	+ 4	49 3	N	*I P W* *d* + 4 b − 3 7 58 5 Q + 2 6	5 7 26 93	+ 83	8 76	39 63				
	16 5	+ 9 4	N		5 5 2 68	+ 2	89	N		6 7	38	5	39 6(	9 635	− 0 5	− 0 9	0 39 48
	1658	+ 28 5	N		7 18 28	+ 2 3	2 59	N		7 58 0	+ 2	6 9	39 6				
	16 1	+ 17 17	N		8 54 35	+ 2 19	56 4	N		19 33 5	+ 2 44	6 9	39 65				
	1597	− 8 54	S		4 54 48 4	+ 9	50 37	S		5 5 26 9)	+ 3 5	3 4	0 39 67				
	1611	+ 2 44	S		58 27 26	+ 2 8	29 34	S		9 6 6	7	8)	39 5)	39 635	− 0 5	+ 0 3	39 3
	1624	+ 11 3	S		5 5 83	+ 5	53 98	S		3 3	+ 57	33 6	39 6				
	1638	− 6 58	S		39	+ 98	3 37	S		5 04	+ 99	53 3	39 66				

* Owing to the rregula rate of the Chronograph the Pen Equation had to be applied graphically on the reco d before the star gnals were read off and consequently in these cases $Q = 0\ 00$

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

MADRAS (E) Lat 13° 4 Long 5h 21 9 AND BANGALORE (W) Lat 13° 1 Long 5 10m 30s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By St h with Telescope No 2): Star Aspect	Instrumental Position and Constants	Mean Observed Time	Total Correction	Sidereal Time of Corrected Transit	Transits Observed at W (By H mnde with Telescope No 1): Star Aspect	Instrumental Position and Constants	Mean Observed Time	Total Correction	Sidereal Time of Corrected Transit	Diff of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Correction for Personal Equation $S_E - H_N = -$; $S_S - H_S = +0.3$	$\Delta L + \rho$
1887					h m	s				h m			m				
D 1	1810	+ 16 2	N	I P W	5 29 3 77	− 2 8	29 69	N	I P W	5 4 1	− 2 75	9 5	0 39 56	39 587	—	− 9	39 433
	1821	+ 15 47	N	d; c − 0 4	3 24 74	− 9	2 63	N	d; + 4	42 5	− 2 4	2 6	39 6				
	1837	+ 24 32	N	b + 4	33 14 15	− 2	12 15	N	b − 3 7; + 58 5	43 54 73	− 2 99	5 74	39 59				
				Q − 2 3					Q − 2 61								
	1708	− 12	S		5 12 57 57	− 32	55 25	S		5 23 37 00	− 2 1	34 89	0 39 64	39 600	− 5	+ 3	0 39 488
	1765	− 1 17	S		2 37 56	− 2 24	35 32	S		32 17 24	− 2 36	4 88	39 56				
Dec 19	1602	+ 38 2	N	I P E	4 54 58 86	+ 1 96	6 82	N	I P W	5 5 37 87	+ 2	4 9	39 27	39 3	+	− 0 9	39 34
	1651	+ 9 4	N	d; − 4	5 3 3 47	+ 2 00	34 47	N	d; + 4	4 7	+ 54	3 7	39 4				
	1671	+ 17 7	N	b − 3 3; a + 5 6	7 6 1	+ 2 0	8 3	N	b; + 33 3	17 44 8	+ 57	47 38	39 25				
				Q + 2 14					Q + 2 6								
	1597	− 8 54	S		4 53 0 15	+ 2 08	2 23	S		5 3 38 49	+ 2 91	41 40	10 39 7	39 3	+ 0	+ 0 03	39 36
	1611	+ 2 44	S		56 38 95	+ 2 5	4	S		7 7 48	+ 2 76	2 24	39 24				
	1624	+ 11 13	S		59 3 63	+ 2 04	5 67	S		9 4 23	+ 2 65	44 88	39 21				
	1638	− 6 58	S		5 1 22 99	+ 2 08	5 7	S		12 1 4	+ 2 89	4 3	39 23				
	1774	+ 23 16	N	Q − 2 14	5 21 43 68	− 2 28	41 40	N	Q − 2 62	5 32 23 43	− 2 75	20 68	10 39 28	0 39 293	+ 0 0	− 0 029	0 39 274
	1810	+ 6 2	N		27 43 2	− 2 6	4 96	N		38 2 9	− 2 65	2 5	39 9				
	1821	+ 15 47	N		29 36 13	− 2 27	33 86	N		40 15 84	− 2 63	3 9	39 33				
	1837	+ 24 32	N		31 25 68	− 2 29	23 39	N		42 5 4	− 2 77	2 66	39 27				
	1 08	− 12 0	S		5 11 8 97	− 2 19	6 78	S		5 21 48 33	− 2 29	46 04	10 39 26	1 39 98	+ 0 0	+ 0 013	10 39 221
	1 1	− 20 51	S		12 44 6	− 2 17	41 99	S		28 23 29	− 2 6	21 3	39 4				
	1 43	+ 3 41	S		17 40 24	− 2 23	38 01	S		28 19 7	− 2 49	17 22	39 21				
	1765	− 7	S		19 48 98	− 2 2	46 6	S		30 28 37	− 2 43	25 94	39 8				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

MADRAS (E) *Lat 13° 4 Long 5 21 9* AND BANGALORE (W) *Lat 13 1 Long 5 10m 30s*

Astronomical Date	Star: B A C Number	Star: Decl	Transits Observed at E (By St h with Telescope No 2): Sta Aspect	Instl Parts and Corrections	Mean Observed Time	Total Correction	Corrected Time	Transits Observed at W (By H with Telescope No 1): Sta Aspect	Instl Parts and Corrections	Mean Observed Time	Total Correction	Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Personal Equation $S_N - H_N = -0\ 09$, $S_S - H_S = +0\ 03$	ΔL + ρ
1887					h					h m			m				
Dec 29	197	+ 3	N	I P E	5 5 4 87	of	44)3	N	I P E	6 3 68	58	4 (	3) 33	= 39 36	+ 0	− 0 9	10 39 348
	1986	+ 9 49	N	d − 3 4	54 3 9	2 09	6	N	d −	5 69	6	5 3	39 9				
	2038	+	N	b − −) 5	6 3 33 8	+ 04	35 2	N	b 5 + 5	4 2	+ 58	4 7	3) 48				
				Q + 2 14					Q + 63								
	1959	− 4 56	S		5 5 6	+)5	8 6	S		6 0 47 36	+ 04	47 40	1 39 34	= ?9 363	+	+ 0 03	39 386
	2017	+ 8	S		59 9 93	+ 07	2 00	S		9 48 66	+ 6	5 8	39 28				
	2030	− 4	S		6 5	00	5	S		58 86	+ 66	61 52	39 47				
	2097	+ 8 7	N	Q − 2 4	6 2 98	−	78	N	Q − 2 63	6 22 62 63	− 68	59)5	39 17	= 39 9	+	− 9	39 6
	2184	+ 6 3	N		23 59 2	− 25	56 97	N		34 38 84	− 65	36 9	39 2				
	2171	− 9	S		6 20 53 27	− 36	50 9	S		6 31 32 69	−2 58	30 1	39 20	= 39 8	+	+ 0 03	0 39 23
Dec 30	1975	+ 23 1	N	I P E	5 52 4 64	+2 13	43 77	N	I P E	6 3 20 55	+2 50	23 05	0 39 28	= 39 9	+	− 0 29	39 74
	1986	+ 19 49	N	d − 4	54	+	4 8	N	d −	5 5	+ 54	4 5	39				
	2038	+ 21	N	b − 4 9 a −26 8	6 3 32	+	34	N	b + 6 22 4	4 85	+ 53	13 38	39 (				
	2047	+ 22 34	N	Q + 2 7	5 0 4	2 1	2 53	N	Q + 2 63	5 49 4	+2 5	5 9	39 38				
	1959	− 14 56	S		5 50 5 1	+1 74	6 85	S		6 0 43 36	+2 83	46 9	39 34	= 0 39 305	+ 0	+ 0 03	10 39 328
	2017	+ 12 18	S		59 8 73	+2	10 75	S		9 47 41	+ 58	49 99	39 24				
	2030	− 10 4	S		6 1 19 04	+ 78	20 82	S		11 57 36	+2 80	6 16	39 34				
	2059	+ 4 39	S		6 49 53	+1 94	51 47	S		17 28 11	+2 66	30 77	39 3				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

MADRAS (E) *Lat 13° 4 Lo g 5h 21 9s* AND BANGALORE (W) *Lat 13° 1 Lo g 5h 10m 30s*

Astronomical Date	Star: B A C Number	Star: D l natio	Transits Observed at E, *By Str han w th Telescop No 2*: Star Aspect	I strumental Pos tion and Correct on C ta t	Mean Observed Time	Total Correc t on	Seconds of C rrect ed Tim	Transits Observed at W, *By H nde with T lescope No 1*: Star Aspect	I strume tal P t d Correcti C t t	M n Obs rved Time	Total Correc tio	Seco ds of Corre t ed T me	Differen e f C rre ted T mes (W − E): By each Sta	M an f Gro p	Correctio f Rate f W Clock	Corrns f Persl Equation $S_N - H_N = -0^s 9$, $S_S - H_S = +0 3$	$\Delta L + \rho$
1887					h m	s				h m	s		m				
Dec 30	2097	+ 28 7	N	*I P E*	6 12 21 66	−2 15	19 51	N	*I P E*	6 22 61 52	−2 83	58 69	39 8	m 39 8	+ 0 0	− 0 09	39 09
	2111	+ 15 59	N	d c − 1 4	4 4 68	−2 29	2 39	N	d − 2 2	24 54 32	−2 69	51 63	39 24				
	2184	+ 16 30	N	b − 4 9 −26 8	23 57 99	−2 28	55 71	N	b + 0 6 +2 4	34 37 68	−2 69	34 99	39 28				
	2199	+ 13 21	N	Q − 2 17	26 44 18	−2 32	41 86	N	s Q − 2 63	37 23 74	−2 67	21 7	39 2				
	2126	+ 7 25	S		6 15 54 76	−2 38	52 38	S		6 26 34 23	−2 62	31 6	39 23	m 39 35	+ 0	+ 0 3	0 39 58
	2144	+ 7 40	S		17 46 31	−2 37	43 94	S		8 25 78	−2 62	23 16	39 22				
	2160	− 22 53	S		19 26 22	−2 68	23 54	S		30 5 3	−2 35	2 78	39 24				
	2171	− 9 1	S		20 52 3	−2 64	49 66	S		3 31 3	−2 39	28 9	39 25				
1888																	
Jan 2	1975	+ 23 1	N	*I P W*	5 52 37 78	+2 10	39 88	N	*I P W*	6 3 16 42	+3 04	9 46	0 39 58	m 39 63	+ 0 009	− 0 029	0 39 543
	1986	+ 19 49	N	d c − 2 4	54 18 82	+2 11	20 93	N	d c + 2	4 57 55	+2 93	60 48	39 55				
	2038	+ 21 11	N	b − 0 6 a − 1 2	6 3 28	+2 10	30 22	N	b + 0 2 a −88 0	14 6 77	+2 98	9 75	39 53				
	2047	+ 22 34	N	Q + 2 18	5 6 56	+2 0	8 66	N	Q + 2 63	15 45 22	+3 03	48 25	39 59				
	1969	− 14 56	S		5 50 0 88	+2 10	2 98	S		6 0 40 85	+1 72	42 57	10 39 59	m 1 39 550	+ 0 009	+ 0 013	10 39 572
	2017	+ 12 18	S		59 4 80	+2 12	6 92	S		9 43 78	+2 65	46 43	39 51				
	2030	− 10 4	S		6 1 14 91	+2 10	17 0	S		1 54 69	+1 87	56 56	39 55				
	2059	+ 4 39	S		6 45 52	+2 11	47 63	S		17 24 79	+2 39	27 18	39 55				
	2097	+ 28 17	N	Q − 2 18	6 12 17 95	−2 25	15 70	N	Q − 2 63	6 22 57 4	−1 99	55 15	10 39 45	m 10 39 5 3	+ 0 009	− 0 029	10 39 483
	2184	+ 16 30	N		23 54 16	−2 26	51 90	N		34 33 86	−2 46	31 40	39 5				
	2199	+ 13 21	N		26 40 19	−2 26	37 93	N		37 20 07	−2 58	17 49	39 56				
	2126	+ 7 25	S		6 15 50 73	−2 25	48 48	S		6 26 30 77	−2 77	28 00	10 39 52	m 1 39 5 7	+ 0 009	+ 0 013	10 39 539
	2144	+ 7 40	S		17 42 34	−2 25	40 09	S		28 22 38	−2 76	19 62	39 53				
	2171	− 19 10	S		20 48 13	−2 26	45 87	S		31 29 06	−3 69	25 37	39 50				

OF THE APPARENT DIFFERENCE OF LONGITUDES ΔL − ρ

BANGALORE (E) *L t 13° 1 Lo g 5 10ᵐ 30ˢ* AND NAGARKOIL (W) *L t 8° 11 Lo g 5ʰ 9ᵐ 55*

Astronomical Date	Star: B A C Numb	Star: D l at	Transits Observed at E, By H with T l cop N 1: Star Aspect	I t m tal I t n d C t C t t	M n Observed T me	T tal C ti	Secon d f C rect ed T	Transits Observed at W, By St h with T l p N 2: Star Aspect	I trum t l P t d C rect C t t	M Ob ed T m	T t l C rrec t o	S l f C t ed I m	Diff rence of C rre ted Times (W − E): By ea h Sta	Mean of G o p	Correction f Rate of E Clock	Corrns for Persl Equati ns $H_N - S_N = +$ 029, $H_S - S_S = -$ 0 3	ΔL − ρ
1888					*h m*	*s*				*h m*			*m*				
Jan 15	2278	+ 6 4	N	*I P W*	6 5 5 77	+ 37	53 4	N	*I P W*	6 53 27 32	+ 55	28 87	0 35 73				
	2299	+ 24 23	N	*d* − 4 7	55 53 4	+2 38	55 42	N	*d* −	56 29 66	+ 54	3 0	35 78	= 0 35 735	+ 8	+ 0 029	0 35 65
	2330	+ 6 7	N	b − (8 9	7 4 33	+ 4	6 75	N	b − 8 − 8 4	7 5 9	+ 5	52 44	35 69				
	2338	+ 39 3	N	Q + 2 58	4 5 04	+2 29	17 33	N	Q + 55	4 5 46	+1 6	53 7	35 74				
	2307	− 4 5	S		6 57 38 83	+2 5	4 33	S		6 58 15 56	+1 45	7	35 68				
	2319	− 5 28	S		58 59 3	+2 54	61 85	S		59 36 2	+ 4	37 43	35 58	= 0 35 635	+ 0 08	− 0 3	0 35 6 3
	2348	− 4 4	S		7 4 57 63	+2 5	60 3	S		7 5 34 33	+ 44	35 77	35 64				
	2358	− 8	S		6 26 36	+2 49	8 85	S		7 3 03	+1 46	4 49	35 64				
	2410	+ 2 1	N	Q − 2 58	7 3 49 02	−2 77	46 25	N	Q − 55	7 4 23 4	− 57	21 83	0 35 58				
	2423	+ 2 39	N		5 43 6	− 6	4 5	N		16 7 73	− 56	6 7	35 67	= 0 35 665	+ 0 00	+ 29	0 35 695
	2442	+ 8	N		9 9 8	− 8	6 37	N		19 43 63	− 54	42 09	35 72				
	2455	+ 2 46	N		20 36 06	−2 77	33 29	N		21 10 54	−1 56	8 98	35 69				
	2399	− 3 9	S		7 11 24 37	− 57	1 80	S		7 59 09	−1 75	57 34	0 35 54				
	2405	− 27 4	S		12 8 89	−2 59	26 3	S		13 3 65	− 73	1 92	35 62	= 0 35 593	+ 0 08	− 0 0 3	0 35 58
	2418	− 24 45	S		14 26 99	−2 59	24 40	S		5 1 73	−1 72		35 6				
	2437	− 5 46	S		17 18 5	−2 66	16 9	S		17 53 35	−1 66	5 69	35 60				
Jan 16	2278	+ 26 4	N	*I P E*	6 52 49 38	+2 47	5 85	N	*I P W*	6 53 5 89	+ 63	27 52	0 35 67				
	2299	+ 24 23	N	*d* −	55 51 63	+2 48	54 11	N	*d* −	56 28 14	+1 62	29 76	35 65	= 0 35 620	+ 0 00	+ 0 029	0 35 650
	2330	+ 16 7	N	b − 0 5 *a* +10 0	7 2 96	+2 52	15 48	N	b + 1 1 *a* − 6 3	7 2 49 47	+ 61	5 08	35 6				
	2338	+ 39 30	N	Q + 2 60	4 13 65	+2 39	6 04	N	Q + 1 56	4 49 9	+1 69	5 60	35 56				
	2307	− 4 5	S		6 57 37 42	+2 61	40 03	S		6 58 14 10	+1 56	15 66	0 35 63				
	2319	− 15 28	S		58 57 84	+2 65	60 49	S		59 34 59	+ 52	36 11	35 62	= 0 35 588	+ 0 08	− 0 013	0 35 576
	2348	− 4 4	S		7 4 56	6	58 81	S		7 5 32 78	+ 55	34 33	35 52				
	2358	− 0 18	S		6 24 95	+2 59	27 54	S		7 55	+ 57	3 12	35 58				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

BANGALORE (E) *Lat 13° 1 Long 5h 10m 30s* AND NAGARKOIL (W) *Lat 8° 11 Long 5h 9m 55*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Heaviside with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Pers'l Equations $H_N - S_N = +0^s.029$, $H_S - S_S = -0.013$	$\Delta L - \rho$
1888					h m s	s	s			h m s	s	s	m s	m s			
Jan 16	2410	+ 22 11	N	*I I E*	7 13 47 61	−2 71	44 90	N	*I P W*	7 14 21 87	−1 50	20 37	0 35 47				
	2423	+ 20 39	N	d c − 2 1	15 41 88	−2 70	39 18	N	d c 0 1	16 16 22	−1 4[illegible]	14 73	35 55	0 35 513	+ 0 001	+ 0 029	0 35 543
	2442	+ 28 1	N	b − 0 [illegible] a + 10 0	18 7 81	−2 74	5 0[illegible]	N	b + 1 a − 6 [illegible]	18 42 08	−1 49	40 59	35 5				
	24[illegible]	+ 21 4[illegible]	N	s Q − 2 60	20 34 [illegible]9	−2 71	31 98	N	s Q − 1 56	21 8 98	−1 49	7 49	35 51				
	2399	− 30 29	S		7 11 22 87	−2 48	20 39	S		7 11 57 67	−1 65	56 02	0 35 63				
	2405	− 27 41	S		12 27 46	−2 49	24 97	S		13 2 19	−1 64	0 55	35 58	0 35 575	+ 0 001	− 0 013	0 35 563
	2418	− 24 45	S		14 25 59	−2 51	23 08	S		14 60 24	−1 63	58 61	35 [illegible]3				
	2437	− 5 46	S		17 17 35	−2 59	14 [illegible]6	S		17 51 89	−1 57	50 3	35 56				
Jan 17	2299	+ 24 23	N	*I P E*	6 55 50 24	+ 2 50	5 74	N	*I I E*	6 56 26 86	+ 1 57	28 43	0 35 69				
	2330	+ 16 7	N	d c − 2 1 b − 0 2 a + 9 8 s Q + 2 62	7 2 11 53	+ 2 55	14 08	N	d c + 1 3 b − 1 2 a + 1 8 s Q + 1 57	7 2 48 07	+ 1 56	49 63	35 55	0 35 620	+ 0 001	+ 0 029	0 35 650
	2338	+ 39 30	N		4 1 21	+ 2 42	14 63	N		4 48 70	+ 1 55	50 25	35 62				
	2307	− 4 5	S		6 57 35 97	+ 2 64	38 61	S		6 58 12 62	+ 1 59	14 21	0 35 60				
	2319	− 15 28	S		58 56 41	+ 2 68	59 09	S		59 3[illegible] 05	+ 1 59	34 64	35 55	0 3[illegible] [illegible]3	+ 0 001	− 0 013	0 35 525
	2358	− 0 18	S		7 6 23 5[illegible]	+ 2 61	26 19	S		7 7 0 09	+ 1 56	1 65	35 46				
	2410	+ 22 11	N	s Q − 2 62	[illegible] 13 46 1[illegible]	−2 73	43 44	N	s Q − 1 57	7 14 20 62	−1 57	19 05	0 35 61				
	2423	+ 20 39	N		15 40 52	−2 72	37 80	N		16 14 92	−1 58	13 34	35 54	0 35 567	+ 0 001	+ 0 029	0 3[illegible] 9[illegible]
	2442	+ 28 1	N		19 6 44	−2 74	3 70	N		19 40 82	−1 57	39 25	35 55				
	2399	− 30 29	S		7 11 21 41	−2 49	18 92	S		7 11 56 06	−1 53	54 53	0 35 61				
	2405	− 27 41	S		12 26 08	−2 51	23 57	S		12 60 60	−1 53	59 07	35 50	0 35 565	+ 0 001	− 0 013	0 35 553
	2418	− 24 45	S		14 24 15	−2 52	21 63	S		14 58 78	−1 55	5[illegible] 23	35 60				
	2437	− 5 46	S		17 15 92	−2 59	13 33	S		17 50 43	−1 55	48 88	35 55				

OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL − ρ

BANGALORE (E) *Lat* 13° 1 *Long* 5ʰ 10ᵐ 30ˢ AND NAGARKOIL (W) *Lat* 8° 11 *Long* 5ʰ 9ᵐ 55ˢ

Astronomical Date	Star		Transits Observed at E, By Heaviside with Telescope No 1					Transits Observed at W, By Strahan with Telescope No 2					Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns for Persl Equations $H_N - S_N = +0\ 029$, $H_S - S_S = -0\ 013$	ΔL − ρ
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1888					h m s	s	s			h m s	s	s	m s				
Jan 18	2278	+ 26 4	N	I P W	6 52 46 28	+ 2 67	48 95	N	I P E	6 53 23 08	+ 1 57	24 65	0 35 70				
	2299	+ 24 23	N	d c + 0 3	55 48 59	+ 2 66	51 25	N	d c + 1 3	56 25 36	+ 1 59	26 95	35 70	m s 0 35 685	+ 0 001	+ 0 029	0 35 715
	2330	+ 16 7	N	b + 1 1 a − 1 4	7 2 9 94	+ 2 65	12 59	N	b − 0 1 a + 4 2	7 2 46 66	+ 1 59	48 25	35 66				
	2338	+ 39 30	N	s Q + 2 62	4 10 47	+ 68	13 15	N	s Q + 1 58	4 47 28	+ 1 55	48 83	35 68				
	2307	− 4 5	S		6 57 34 48	+ 2 64	37 12	S		6 58 11 15	+ 1 63	12 78	0 35 66				
	2319	− 15 28	S		58 54 97	+ 2 62	57 59	S		59 31 56	+ 1 65	33 21	35 62	m s 0 35 665	+ 0 001	− 0 013	0 35 653
	2348	− 4 4	S		7 4 53 27	+ 2 64	55 91	S		7 5 29 95	+ 1 63	31 58	35 67				
	2358	− 0 18	S		6 21 98	+ 2 64	24 62	S		6 58 70	+ 1 63	60 33	35 71				
	δ Gem	+ 22 11	N	s Q − 2 62	7 13 44 52	− 2 57	41 95	N	s Q − 1 58	7 14 19 16	− 1 56	17 60	0 35 65				
	2423	+ 20 39	N		15 38 82	− 2 59	36 23	N		16 13 46	− 1 57	11 89	35 66	m s 0 35 625	+ 0 001	+ 0 029	0 35 655
	2412	+ 28 1	N		19 4 75	− 2 57	2 18	N		19 39 35	− 1 59	37 76	35 58				
	2450	+ 21 46	N		20 31 64	− 2 58	29 06	N		21 6 23	− 1 56	4 67	35 61				
	2399	− 30 29	S		7 11 20 10	− 2 63	17 47	S		7 11 54 56	− 1 49	53 07	0 35 60				
	2405	− 27 41	S		12 24 65	− 2 62	22 03	S		12 59 14	− 1 49	57 65	35 62	m s 0 35 615	+ 0 001	− 0 013	0 35 603
	2418	− 24 45	S		14 22 77	− 2 62	20 15	S		14 57 23	− 1 49	55 74	35 59				
	2437	− 5 46	S		17 14 41	− 2 63	11 78	S		17 48 96	− 1 5	47 43	35 65				
Jan 19	2278	+ 26 4	N	I P W	6 52 44 74	+ 2 63	47 37	N	I P W	6 53 21 56	+ 1 54	23 10	0 35 73				
	2299	+ 24 23	N	d c + 0 3	55 47 05	+ 2 64	49 69	N	d c − 0 1	56 23 83	+ 1 54	25 37	35 68	m s 0 35 713	+ 0 001	+ 0 029	0 35 743
	2330	+ 16 7	N	b + 1 1 a + 0 6	7 2 8 35	+ 2 64	10 99	N	b − 0 9 a + 0 3	7 2 45 17	+ 1 54	46 71	35 72				
	2338	+ 39 30	N	s Q + 2 60	4 8 94	+ 2 63	11 57	N	s Q + 1 56	4 45 75	+ 1 54	47 29	35 72				
	2307	− 4 5	S		6 57 32 87	+ 2 63	35 50	S		6 58 9 69	+ 1 54	11 23	0 35 73				
	2319	− 15 28	S		58 53 34	+ 2 64	55 98	S		59 30 14	+ 1 54	31 68	35 70	m s 0 35 708	+ 0 001	− 0 013	0 35 696
	2348	− 4 4	S		7 4 51 66	+ 2 64	54 30	S		7 5 28 48	+ 1 54	30 02	35 72				
	2358	− 0 18	S		6 20 43	+ 2 63	23 06	S		6 57 20	+ 1 54	58 74	35 68				

OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL — ρ

BANGALORE (E) *Lat 13° 1, Long 5h 10m 30s;* **AND NAGARKOIL** (W) *Lat 8° 11 Long 5h 9m 55*

Astronomical Date	Star		Transits Observed at E — *By Heavinde, with Telescope No 1*					Transits Observed at W — *By Strahan with Telescope No 2*					Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns for Persl Equations $H_N - S_N = + 0^s 029$, $H_S - S_S = - 0\ 013$	ΔL − ρ
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1888		°			h m s	s	s			h m s	s	s	m s				
Jan 19	δ Gem	+ 22 11	N	*I I W*	7 13 42 94	−2 56	40 38	N	*I P W*	7 14 17 72	−1 58	16 14	0 35 ,6				
	2423	+ 20 39	N	d c + 0 3	15 37 26	−2 56	34 70	N	d c − 0 1	16 11 94	−1 58	10 36	35 66	m s 0 35 18	+ 0 001	+ 0 029	0 35 748
	2442	+ 28 1	N	b + 1 1, a + 0 6	19 3 18	−2 57	0 61	N	b ∓ 0 9, a + 0 3	19 37 93	−1 58	36 35	35 ,4				
	2455	+ 21 46	N	Q − 2 60	20 30 05	−2 56	27 49	N	Q − 1 56	21 4 78	−1 58	3 20	35 71				
	2399	− 30 29	S		7 11 18 45	−2 56	15 89	S		7 11 53 19	−1 57	51 62	0 35 73				
	2405	− 27 41	S		12 23 05	−2 56	20 49	S		12 57 74	−1 58	56 16	35 67	m s 0 35 690	+ 0 001	− 0 013	0 35 6,8
	2418	− 24 45	S		14 21 11	−2 56	18 55	S		14 55 79	−1 58	54 21	35 66				
	2437	− 5 46	S		17 12 80	−2 56	10 24	S		17 47 52	−1 58	45 94	35 70				
Jan 20	2278	+ 26 4	N	*I P E*	6 52 43 15	+2 71	45 86	N	*I P W*	6 53 19 86	+1 61	21 47	0 35 61	m s 0 3 600	+ 0 001	+ 0 029	0 5 630
	2299	+ 24 23	N	d c − 2 1, b + 1 4, a + 0 6, Q + 2 73	55 45 46	+2 71	48 17	N	d c + 1 9, b + 1 8, a + 5 6, Q + 1 56	56 22 15	+1 61	2, ,6	35 59				
	2307	− 4 5	S		6 57 31 33	+2 71	34 04	S		6 58 7 96	+1 66	9 62	0 35 58				
	2319	− 15 28	S		58 51 74	+2 72	54 46	S		59 28 34	+1 ,0	30 04	35 58	m s 0 35 580	+ 0 001	− 0 013	0 35 568
	2348	− 4 4	S		7 4 49 97	+2 85	52 82	S		7 5 26 72	+1 66	28 38	35 56				
	2358	− 0 18	S		6 18 68	+2 85	21 53	S		6 55 47	+1 60	57 13	35 60				
	δ Gem	+ 22 11	N	Q − 2 73	7 13 41 70	−2 89	38 81	N	Q − 1 56	7 14 15 98	−1 50	14 48	0 35 67				
	2423	+ 20 39	N		15 36 01	−2 89	33 12	N		16 10 29	−1 50	8 79	35 67	m s 0 35 640	+ 0 001	+ 0 029	0 35 670
	2442	+ 28 1	N		18 61 92	−2 89	59 03	N		19 36 17	−1 52	34 65	35 62				
	2455	+ 21 46	N		20 28 81	−2 89	25 92	N		21 3 02	−1 50	1 52	35 60				
	2399	− 30 29	S		7 11 17 19	−2 89	14 30	S		7 11 51 28	−1 37	49 91	35 61				
	2405	− 27 41	S		12 21 73	−2 89	18 84	S		12 55 84	−1 38	54 46	35 62	m s 0 35 630	+ 0 001	− 0 013	0 35 618
	2418	− 24 45	S		14 19 86	−2 88	16 98	S		14 54 03	−1 39	52 64	35 66				
	2437	− 5 46	S		17 11 53	−2 89	8 64	S		17 45 72	−1 45	44	35 63				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

BANGALORE (E) *Lat* 13° 1 *Long* $5^h\ 10^m\ 30^s$ AND NAGARKOIL (W) *Lat* 8° 11 *Long* $5^h\ 9^m\ 55$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Heavenside with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $H_N - S_N = +0\ 029$, $H_S - S_S = -0\ 013$	$\Delta L + \rho$
1888					h m s	s	s			h m s	s	s	m s				
Jan 15	2519	+ 17 56	N	I P W	7 32 3 98	+2 41	26 39	N	I P W	7 33 0 65	+1 50	2 15	0 35 ,6				
	2549	+ 26 3	N	c − 4 7 d	36 40 52	+2 36	42 88	N	c − 0 1 d	37 17 18	+1 51	18 69	35 81	m s 0 35 810	0 000	+ 0 029	0 35 839
	2556	+ 20 35	N	b − 1 6, a + 9 2	37 58 31	+2 40	60 71	N	b − 2 8, a − 3 2	38 35 05	+1 50	36 55	35 84				
	2558	+ 18 47	N	Q + 2 58 s	39 1 83	+2 41	4 24	N	Q + 1 55 s	39 38 56	+1 51	40 07	35 83				
	2503	+ 6 7	S		7 30 0 40	+2 46	2 86	S		7 30 37 17	+1 49	38 66	0 35 80				
	2513	− 3 52	S		31 6 05	+2 50	8 55	S		31 42 88	+1 47	44 35	35 80	m s 0 35 818	0 000	− 0 013	0 35 805
	2531	− 26 33	S		33 37 72	+2 57	40 29	S		34 14 ,0	+1 44	16 14	35 85				
	2542	− 9 17	S		35 17 29	+2 52	19 81	S		35 54 17	+1 46	55 63	35 82				
	2632	+ 20 11	N	Q − 2 58 s	7 48 36 42	−2 76	33 66	N	Q − 1 55 s	7 49 11 08	−1 59	9 49	0 35 83				
	2639	+ 16 5	N		50 6 64	−2 74	3 90	N		50 41 24	−1 60	39 64	35 74	m s 0 35 90	0 000	+ 0 029	0 35 819
	2672	+ 28 6	N		56 7 11	−2 80	4 31	N		56 41 63	−1 58	40 05	35 74				
	2688	+ 27 51	N		58 13 95	−2 82	11 13	N		58 48 56	−1 58	46 98	35 85				
	2652	− 22 35	S		7 51 31 59	−2 59	29 00	S		7 52 6 45	−1 65	4 80	0 35 80				
	2655	− 30 2	S		52 41 36	−2 56	38 80	S		53 16 27	−1 67	14 60	35 80	m s 0 35 [illegible] 3	0 000	− 0 013	0 35 60
	2666	− 18 5	S		54 19 79	−2 61	17 18	S		54 54 55	−1 66	52 89	35 71				
	2708	− 29 25	S		59 11 99	−2 60	9 39	S		59 46 82	−1 65	45 17	35 78				
Jan 16	2519	+ 17 56	N	I P F	7 32 24 07	+2 49	26 56	N	I P W	7 33 0 69	+1 62	2 31	0 35 75				
	2549	+ 26 3	N	c − 2 1 d	36 40 62	+2 43	43 05	N	c − 0 1 d	37 1, 23	+1 64	18 86	35 81	m s 0 35 98	0 000	+ 0 029	0 35 827
	2556	+ 20 35	N	b − 0 5, a + 18 2	37 58 41	+2 47	60 88	N	b + 1 1, a − 6 3	38 35 08	+1 63	36 71	35 83				
	2558	+ 18 47	N	Q + 2 60 s	39 1 95	+2 49	4 44	N	Q + 1 56 s	39 38 62	+1 62	40 24	35 80				
	2503	+ 6 7	S		7 30 0 47	+2 58	3 05	S		7 30 37 19	+1 57	38 76	0 35 71				
	2513	− 3 52	S		31 6 13	+2 65	8 ,8	S		31 42 92	+1 55	44 47	35 69	m s 0 35 688	0 000	− 0 013	0 35 675
	2531	− 26 33	S		33 37 77	+2 83	40 60	S		34 14 77	+1 48	16 25	35 65				
	2542	− 9 17	S		35 17 36	+2 70	20 06	S		35 54 23	+1 53	55 ,6	35 70				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L + \rho$

BANGALORE (I) ... AND NAGARKOIL (W) ...

Astronomical Date	Star R.A.	Star Decl.	Clamp	I: Level, Collimation etc.	I: Mean Obs. T	I: Total Corr.	I: Sidereal time of transit	Clamp	W: Level, Collimation etc.	W: Mean Obs. T	W: Total Corr.	W: Sidereal time of transit	Diff. of Clock times (W − I) By each Star	Mean of ...	Corr. for Rate of W Clock	Corr. for Pers. Eq.	$\Delta L + \rho$
18.5					*h*					*h*			*m*				
Jan. 11	13		N	*I I I*	7 45 (54	−2	33 8	N	*I P B*	7 49	− 5	) 53	35 7				
	3)	+ 6 5	N	l	5 (	− ( )	4	N	l	5 4 5	− 5	39	3 4		00	+ 0 0 9	0 3 34
	(	8 (	N	+ 8	5(	−)	4 4(	N	− 6	56 4	+ 0 8	4)	35 63				
	688	5	N	Q − (	58 4	−)		N	Q − (	58 48 5	− 48	47	35 74				
	(	35	S		5 3 (	− 4	)	S		7 5 6 4	− (	4 8	0 35 (				
	(	−	S		5 4 4	4	)	S		53 (	−1 64	4 ((	5 9			− 0 3	5 64
	66	5	S		4) 8	− 44	4	S		54 54	− (	53	35 ( )				
Jan. 1	19	+ 5(	N	*I P I*	3 4 34	+ 4	(88	N	*I P L*	7 33 0 9	+ 5	2 52	0 35 64				
	4)	+ (	N	d	3(4 85	+ 5	43 8	N	*i* 3	7 7 4	+ 5(	9	3		00	+ 0 9	0 3 59
	6	+	N	+) 8	37 58 (	+ 5	(5	N	+ 8	38 5 5	+ 7	( )	35				
	8	+ 84	N	Q + 6	3) (	+ 5	4 ( )	N	Q + 1 5	9 38)	+ 5(	4 48	3)				
	03	+ (	S		3 /	+ (		S		3	+ 5	39 8	35 (				
	13	− 3	S		3 ((	+ (4	)	S		3 43 6	58	44 4	3 74		0	− 0 0 3	0 35 42
	31	− (	S		37 9(	+	4 ( )	S		34 4 84	+ (	6 44	3	*m*			
	1	−)	S		3 5	+ 6		S		5 54 3)	+ 55	55 9	35				
	( )	+ (5	N	Q − (	0 ( )4	− ( )	4	N	Q − 5/	50 41 58	−1 5	40 01	0 (	93			
		+ 8 (	N		(4	−	4 6/	N		56 4 0(	− 58	4 48	35 8			+ 0 29	0 3 8
	158	+	N		58 4 (	− 4	5	N		58 48)2	− 5)	4 33	35 8				
	(	− 3	S		1 3 81	− 5	9 8	S		7 5 (58	− 5	5 3	0 35 75				
		−	S		5 41 (	−2 5	) (	S		3 (3)	− 54	4 85	35)	93	00	− 0 0 3	0 35 780
	(((	− 8 5	S		54 0 4	− 55	1/ 41	S		54 54 8	−1	53 27	35 8		0		
	08	−)	S		5) 2	− 5	)	S		5) 4)	− 54	4 5	3 8				

O ... t ... I ... t ... f ti Cl ... p1 tl ... Ien Eq ... t ... d t ... p1 d ... p1 ... lly on the record before the st ... s ... als were read off and con ... sequently ... Q − o

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

BANGALORE (E) *Lat* 13° 1 *Long* 5h 10m 30s AND NAGARKOIL (W) *Lat* 8° 11 *Long* 5h 9m 55

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Heavyside with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $H_N - S_N = +0\ 029$, $H_S - S_S = -0\ 013$	$\Delta L + \rho$
1888					h m s	s	s			h m s	s	s	m s				
Jan 18	2519	+ 17 56	N	I P W	7 32 24 46	+2 66	27 12	N	I P F	7 33 1 36	+1 59	2 95	0 35 83				
	2549	+ 26 3	N	d c + 0 3	36 40 99	+2 65	43 64	N	d c + 1 3	37 17 92	+1 57	19 49	35 85	m s 0 35 858	0 000	+ 0 029	0 35 887
	2556	+ 20 35	N	b + 1 1 a + 1 8	37 58 78	+2 66	61 44	N	b − 0 1 a + 4 1	38 35 72	+1 59	37 31	35 87				
	2558	+ 18 4	N	s Q + 2 62	39 2 31	+2 66	4 97	N	s Q + 1 58	39 39 26	+1 59	40 85	35 88				
	2503	+ 6 7	S		7 30 0 92	+2 65	3 57	S		7 30 37 79	+1 61	39 40	0 35 83				
	2513	− 3 52	S		31 6 60	+2 66	9 26	S		31 43 50	+1 63	45 13	35 87	m s 0 35 793	0 000	− 0 013	0 35 780
	2531	− 26 33	S		33 38 40	+2 67	41 07	S		34 15 12	+1 67	16 79	35 72				
	2542	− 9 17	S		35 17 90	+2 67	20 57	S		35 54 69	+1 63	56 32	35 75				
	2632	+ 20 11	N	s Q − 2 62	7 48 36 95	−2 58	34 37	N	s Q − 1 58	7 49 11 68	−1 57	10 11	0 35 74				
	2639	+ 16 5	N		50 7 13	−2 58	4 55	N		50 41 93	−1 57	40 36	35 81	m s 0 35 780	0 000	+ 0 029	0 35 809
	2672	+ 28 6	N		56 7 59	−2 59	5 00	N		56 42 37	−1 59	40 78	35 78				
	2688	+ 27 51	N		58 14 42	−2 59	11 83	N		58 49 21	−1 59	47 62	35 79				
	2652	− 22 35	S		7 51 32 31	−2 56	29 75	S		7 52 6 89	−1 49	5 40	0 35 65				
	2655	− 30 2	S		52 42 09	−2 56	39 53	S		53 16 65	−1 47	15 18	35 65	m s 0 35 693	0 000	− 0 013	0 35 680
	2660	− 18 5	S		54 20 42	−2 57	17 85	S		54 55 06	−1 51	53 55	35 70				
	2708	− 29 25	S		59 12 64	−2 56	10 08	S		59 47 35	−1 50	45 85	35 77				
Jan 19	2519	+ 17 56	N	I P W	7 32 25 36	+2 64	28 00	N	I P W	7 33 2 37	+1 52	3 89	0 35 89				
	2549	+ 26 3	N	d c + 0 3	36 41 89	+2 63	44 52	N	d c − 0 1	37 18 91	+1 49	20 40	35 88	m s 0 35 878	0 000	+ 0 029	0 35 907
	2556	+ 20 35	N	b + 1 1 a + 1 8	37 59 67	+2 63	62 30	N	b − 0 9 a + 6 4	38 36 66	+1 50	38 16	35 86				
	2558	+ 18 47	N	s Q + 2 60	39 3 24	+2 64	5 88	N	s Q + 1 56	39 40 24	+1 52	41 76	35 88				
	2503	+ 6 7	S		7 30 1 82	+2 64	4 46	S		7 30 38 79	+1 54	40 33	0 35 87				
	2513	− 3 52	S		31 7 54	+2 64	10 18	S		31 44 45	+1 56	46 01	35 83	m s 0 35 840	0 000	− 0 013	0 35 827
	2531	− 26 33	S		33 39 30	+2 66	41 96	S		34 16 16	+1 62	17 78	35 82				
	2542	− 9 17	S		35 18 81	+2 65	21 46	S		35 55 72	+1 58	57 30	35 84				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

BANGALORE (E) Lat 13° 1 Long 5h 10m 30s AND NAGARKOIL (W) Lat 8° 11 Long 5h 9m 55

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Heaviside with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $H_N - S_N = +0\ 029$, $H_S - S_S = -0\ 013$	$\Delta L + \rho$
1888					h m s	s	s			h m s	s	s	m s	m s			
Jan 19	2632	+ 20 11	N	I P W	7 48 37 84	− 2 57	35 27	N	I P W	7 49 12 72	− 1 62	11 10	0 35 83				
	2639	+ 16 5	N	d; c + 0 3	50 8 08	− 2 56	5 52	N	d; c − 0 1	50 42 85	− 1 60	41 25	35 73	0 3 780	0 000	+ 0 029	0 35 809
	2672	+ 28 6	N	b + 1 1; a + 1 8	56 8 53	− 2 57	5 96	N	b − 0 9; a + 6 4	56 43 34	− 1 63	41 71	35 75				
	2688	+ 27 51	N	s; Q − 2 60	58 15 36	− 2 57	12 79	N	s; Q − 1 56	58 50 23	− 1 63	48 60	35 81				
	2652	− 22 35	S		7 51 33 11	− 2 54	30 57	S		7 52 7 92	− 1 50	6 42	0 35 85				
	2666	− 18 5	S		54 21 33	− 2 55	18 78	S		54 56 07	− 1 52	54 55	35 77	0 3 97	0 000	− 0 013	0 35 784
	2708	− 29 25	S		59 13 57	− 2 55	11 02	S		59 48 29	− 1 50	46 79	35 77				
Jan 20	2519	+ 17 56	N	I P E	7 32 26 26	+ 2 86	29 12	N	I P W	7 33 3 32	+ 1 61	4 93	0 35 81				
	2549	+ 26 3	N	d; c − 2 1	36 42 85	+ 2 86	45 71	N	d; c + 1 9	37 19 89	+ 1 60	21 49	35 78	0 3 780	0 000	+ 0 029	0 35 809
	2556	+ 20 35	N	b + 1 4; a + 0 1	38 0 65	+ 2 86	3 51	N	b + 1 8; a + 7 2	38 37 65	+ 1 61	39 26	35 75				
	2568	+ 18 47	N	s; Q + 2 87	39 4 18	+ 2 86	7 04	N	s; Q + 1 56	39 41 20	+ 1 62	42 82	35 78				
	2531	− 26 33	S		7 33 40 16	+ 2 85	43 01	S		7 34 17 09	+ 1 75	18 84	0 35 83	0 3 790	0 000	− 0 013	0 35 7 7
	2542	− 9 17	S		35 19 74	+ 2 85	22 59	S		35 56 65	+ 1 69	58 34	35 75				
	2632	+ 20 11	N	s; Q − 2 87	7 48 39 27	− 2 88	6 39	N	s; Q − 1 56	7 49 13 70	− 1 51	12 19	0 35 80				
	2639	+ 16 5	N		50 9 54	− 2 88	6 66	N		50 43 84	− 1 50	42 34	35 68	0 3 728	0 000	+ 0 029	0 35 757
	2672	+ 28 6	N		56 9 94	− 2 88	7 06	N		56 44 25	− 1 53	42 72	35 66				
	2688	+ 27 51	N		58 16 78	− 2 88	13 90	N		58 51 20	− 1 53	49 67	35 77				
	2652	− 22 35	S		7 51 34 51	− 2 89	31 62	S		7 52 8 77	− 1 38	7 39	0 35 77				
	2655	− 30 2	S		52 44 26	− 2 89	41 37	S		53 18 57	− 1 36	17 21	35 84	0 35 808	0 000	− 0 013	0 35 795
	2666	− 18 5	S		54 22 68	− 2 89	19 9	S		54 56 97	− 1 41	55 56	35 77				
	2708	− 29 25	S		59 14 94	− 2 89	12 05	S		59 49 30	− 1 40	47 90	35 85				

OF THE APPARENT DIFFERENCE OF LONGITUDES $\Delta L - \rho$

MADRAS (E) *Lat 13 4 Long 5h 21 9* AND NAGARKOIL (W) *Lat 8° 11 Long 5h 9m 55*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Heaviside with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $H_N - S_N = +0\ 043$, $H_S - S_S = +0\ 018$	$\Delta L - \rho$
1888					h m s	s	s			h m s	s	s	m s				
Feb 2	2799	+ 18 42	N	*I P F*	8 17 31 76	+1 87	33 63	N	*I P E*	8 28 47 08	+1 50	48 58	11 14 95				
	2803	+ 18 28	N	c − 2 8 d	25 47 32	+1 87	49 19	N	c + 1 5 d	37 2 56	+1 52	4 08	14 89	m s 11 14 897	+ 0 009	+ 0 043	11 14 949
	2867	+ 10 7	N	b − 1 3, a − 16 9	27 9 02	+1 87	10 89	N	b + 1 4, c + 24 4	38 24 14	+1 60	25 74	14 85				
				Q + 1 93 s					Q + 1 55 s								
	2883	− 31 9	S		8 29 4 72	+1 51	6 23	S		8 40 19 25	+2 02	21 27	11 15 04				
	2893	− 7 36	S		30 35 33	+1 70	37 03	S		41 50 18	+1 77	51 95	14 92	m s 11 14 913	+ 0 009	+ 0 018	11 14 940
	2901	+ 6 6	S		32 18 51	+1 80	0 31	S		43 33 45	+1 64	35 09	14 78				
	2965	+ 29 10	N	Q − 1 93 s	8 40 33 72	−1 92	31 80	N	Q − 1 55 s	8 51 48 30	−1 70	46 60	11 14 80				
	3000	+ 28 41	N		46 23 17	−1 93	21 24	N		57 37 68	−1 68	36 00	14 76	m s 11 14 783	+ 0 009	+ 0 043	11 14 835
	3016	+ 31 0	N		48 3 28	−1 91	1 37	N		59 17 84	−1 71	16 13	14 76				
	3026	+ 28 21	N		49 35 78	−1 93	33 85	N		60 50 34	−1 68	48 66	14 81				
	2904	− 6 50	S		8 38 49 21	−2 15	47 06	S		8 50 3 33	−1 33	2 00	11 14 94	m s 11 14 940	+ 0 009	+ 0 018	11 14 967
Feb 3	2799	+ 18 42	N	*I P W*	8 17 30 66	+1 77	32 43	N	*I P E*	8 28 46 06	+1 51	47 57	11 15 14				
	2810	+ 17 33	N	c − 4 0 d	18 56 72	+1 78	58 50	N	c + 1 5 d	30 12 03	+1 53	13 56	15 06	m s 11 15 07	+ 0 009	+ 0 043	11 15 125
	2853	+ 18 28	N	b − 0 8, a + 10 6	25 46 30	+1 78	48 08	N	b − 0 9, a + 9 9	37 1 60	+1 52	3 12	15 04				
	2867	+ 10 27	N	Q + 1 92 s	27 7 83	+1 80	9 63	N	Q + 1 55 s	38 23 13	+1 55	24 68	15 05				
	2883	− 31 9	S		8 29 3 12	+2 01	5 1	S		8 40 18 35	+1 74	20 09	11 14 96				
	2893	− 7 36	S		30 33 88	+1 90	35 78	S		41 49 19	+1 63	50 82	15 04	m s 11 15 000	+ 0 009	+ 0 018	11 15 027
	2901	+ 6 6	S		32 17 28	+1 84	19 12	S		43 32 5	+1 57	34 12	15 00				
	2911	+ 3 44	S		33 27 83	+1 85	29 68	S		44 43 11	+1 57	44 68	15 00				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

MADRAS (F) *Lat 13 4 Long 5ʰ 21ᵐ 9* AND NAGARKOIL (W) *Lat 8° 11 Long 5ʰ 9ᵐ 55*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Heaviside with Telescope No 1): Stars Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Strahan, with Telescope No 2): Stars Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $H_N - S_N = +0\ 043$ $H_S - S_S = +0\ 018$	$\Delta L - \rho$
1888					h m s	s	s			h m s	s	s	m s	m s			
Feb 3	2965	+ 29 10	N	*I P W*	8 40 32 71	−2 12	30 59	N	*I P E*	8 51 47 33	−1 63	45 70	11 15 11	11 15 183	+ 0 009	+ 0 043	11 15 235
	3016	+ 31 0	N	d c − 4 0	48 2 19	−2 13	0 06	N	d c + 1 5	59 16 85	−1 62	15 23	15 17				
	3026	+ 28 21	N	b − 0 8 a + 10 6	49 34 60	−2 11	32 49	N	b − 0 9 a + 9 9	60 49 38	−1 62	47 76	15 27				
				s Q − 1 92					s Q − 1 55								
	2954	− 6 50	S		8 38 47 91	−1 95	45 96	S		8 50 2 39	−1 48	0 91	11 14 95	11 14 953	+ 0 009	+ 0 018	11 14 980
	2976	− 1 29	S		42 11 99	−1 97	10 02	S		53 26 44	−1 51	24 93	14 91				
	2978	+ 6 15	S		43 7 53	−2 00	5 53	S		54 22 06	−1 53	20 53	15 00				
Feb 4	2799	+ 18 42	N	*I P W*	8 17 29 60	+1 77	31 37	N	*I P W*	8 28 44 77	+1 60	46 37	11 15 00	11 15 023	+ 0 009	+ 0 043	11 15 075
	2810	+ 17 33	N	d c − 4 0	18 55 56	+1 77	57 33	N	d c + 1 7	30 10 74	+1 60	12 34	15 01				
	2853	+ 18 28	N	b − 0 7 a + 0 8	25 45 11	+1 77	46 88	N	b − 0 8 a − 7 7	37 0 27	+1 60	1 87	14 99				
	2867	+ 10 27	N	s Q + 1 89	27 6 60	+1 78	8 38	N	s Q + 1 55	38 21 89	+1 58	23 47	15 09				
	2883	− 31 9	S		8 29 2 2,	+1 80	4 07	S		8 40 17 50	+1 44	18 94	11 14 8,	11 14 943	+ 0 009	+ 0 018	11 14 9 0
	2893	− 7 36	S		30 32 99	+1 79	34 ,8	S		41 48 1,	+1 52	49 67	14 89				
	2901	+ 6 6	S		32 16 22	+1 78	18 00	S		43 31 36	+1 56	32 92	14 92				
	2911	+ 3 44	S		33 26 69	+1 78	28 47	S		44 42 00	+1 56	43 56	15 09				
	2965	+ 29 10	N	s Q − 1 89	8 40 31 54	−2 02	29 52	N	s Q − 1 55	8 51 45 98	−1 45	44 53	11 15 01	11 15 040	+ 0 009	+ 0 043	11 15 092
	3000	+ 28 41	N		46 20 81	−2 02	18 9	N		57 35 29	−1 46	33 83	15 04				
	3016	+ 31 0	N		4, 60 94	− 01	58 93	N		59 15 44	−1 45	13 99	15 06				
	3026	+ 28 21	N		49 33 43	−2 01	31 42	N		60 47 93	−1 46	46 47	15 05				
	2954	− 6 50	S		8 38 46 81	−1 98	44 83	S		8 49 61 38	−1 58	59 80	11 14 97	11 15 000	+ 0 009	+ 0 018	11 15 027
	2976	− 1 29	S		42 10 80	−1 99	8 81	S		53 25 28	−1 54	23 ,4	14 93				
	2978	+ 6 15	S		43 6 32	−1 99	4 33	S		54 20 92	−1 56	19 36	15 03				
	2987	− 3 2	S		44 20 32	−2 00	18 32	S		55 34 96	−1 [illegible]	33 39	15 07				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

MADRAS (E) *Lat 13 4 Long 5h 21m 9* AND NAGARKOIL (W) *Lat 8° 11 Long 5h 9m 50*

Astronomical Date	Star		Transits Observed at E — *By Heaviside with Telescope No 1*					Transits Observed at W — *By Strahan with Telescope No 2*					Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns for Persl Equations $H_N - S_N = +0\ 043$, $H_S - S_S = +0\ 018$	$\Delta L - \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1888					h m s	s	s			h m s	s	s	m s				
Feb 5	2799	+ 18 42	N	*I P E*	8 17 28 46	+1 85	30 31	N	*I P W*	8 28 43 54	+1 56	45 10	11 14 79	m s 11 14 765	+ 0 010	+ 0 043	11 14 818
	2810	+ 17 33	N	d c − 2 8	18 54 44	+1 86	56 30	N	d c − 2 3	30 9 44	+1 56	11 00	14 ,0				
	2853	+ 18 28	N	b + 0 7 a − 4 1	25 43 93	+1 85	45 78	N	b + 2 7 a + 1 9	36 59 03	+1 56	60 59	14 81				
	2867	+ 10 27	N	s Q + 1 90	27 5 56	+1 85	7 41	N	s Q + 1 56	38 20 60	+1 57	22 17	14 76				
	2883	− 31 9	S		8 29 1 06	+1 78	2 84	S		8 40 16 03	+1 58	17 61	11 14 77	m s 11 14 698	+ 0 010	+ 0 018	11 14 ,26
	2893	− 7 36	S		30 31 81	+1 82	33 63	S		41 46 75	+1 57	48 32	14 69				
	2901	+ 6 6	S		32 15 11	+1 85	16 96	S		43 30 07	+1 57	31 64	14 68				
	2911	+ 3 44	S		33 25 72	+1 84	27 56	S		44 40 63	+1 58	42 21	14 65				
	2965	+ 29 10	N	s Q − 1 90	8 40 30 35	−1 92	28 43	N	s Q − 1 56	8 51 44 76	−1 59	43 17	11 14 74	m s 11 14 , 3	+ 0 010	+ 0 043	11 14 806
	3000	+ 28 41	N		46 19 73	−1 92	17 81	N		57 34 13	−1 59	32 54	14 ,3				
	3016	+ 31 0	N		47 59 85	−1 92	57 93	N		59 14 2,	−1 58	12 69	14 ,6				
	3026	+ 28 21	N		49 32 35	−1 92	30 43	N		60 46 79	−1 58	45 21	14 ,8				
	2904	− 6 50	S		8 38 45 65	−1 98	43 67	S		8 49 60 02	−1 54	58 48	11 14 81	m s 11 14 820	+ 0 010	+ 0 018	11 14 848
	29,6	− 1 29	S		42 9 57	−1 99	7 58	S		53 33 94	−1 54	22 40	14 82				
	2978	+ 6 15	S		43 5 22	−1 97	3 25	S		54 1) 60	−1 55	18 05	14 80				
	2987	− 3 2	S		44 19 28	−1 98	17 30	S		55 33 70	−1 55	32 15	14 85				
Feb 6	2799	+ 18 42	N	*I P E*	8 17 27 04	+1 86	28 90	N	*I P E*	8 28 42 19	+1 56	43 75	11 14 8	m s 11 14 98	+ 0 011	+ 0 043	11 14 8 2
	2810	+ 17 33	N	d c − 2 8	18 53 09	+1 87	54 96	N	d c − 0 5	30 8 14	+1 56	9 70	14 4				
	2853	+ 18 28	N	b + 1 1 a + 0 7	25 42 62	+1 86	44 48	N	b + 0 9 a + 2 8	36 57 ,2	+1 56	59 28	14 80				
	2867	+ 10 27	N	s Q + 1 91	27 4 22	+1 87	6 09	N	s Q + 1 56	38 19 32	+1 57	20 89	14 80				
	2883	− 31 9	S		8 28 59 51	+1 87	61 38	S		8 40 14 72	+1 61	16 33	11 14 95	m s 11 14 ,98	+ 0 011	+ 0 018	11 14 827
	2893	− 7 36	S		30 30 41	+1 87	32 28	S		41 45 46	+1 58	47 04	14 76				
	2901	+ 6 6	S		32 13 69	+1 86	15 ,5	S		43 28 72	+1 57	30 29	14 74				
	2911	+ 3 44	S		33 24 31	+1 87	26 18	S		44 39 35	+1 57	40 92	14 74				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

MADRAS (E) *Lat 13° 4 Long 5h 21m 9* AND NAGARKOIL (W) *Lat 8° 11 Long 5h 9m 50*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Heaviside with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $H_N - S_N = +0\ 043$, $H_S - S_S = +0\ 018$	$\Delta L - \rho$
1888					h m s	s	s			h m s	s	s	m s				
Feb 6	2965	+ 29 10	N	*I P E*	8 40 28 91	− 1 95	26 96	N	*I I L*	8 51 43 44	− 1 57	41 87	11 14 91	m s 11 14 898	+ 0 011	+ 0 043	11 14 952
	3000	+ 28 41	N	d c − 2 8	46 18 29	− 1 96	16 33	N	d c − 0 5	57 32 82	− 1 58	31 22	14 89				
	3016	+ 31 0	N	b + 1 1 *a* + 0 7	47 58 44	− 1 95	56 49	N	b + 0 9 *a* + 8	59 12 94	− 1 58	11 36	14 87				
	3026	+ 28 21	N	s Q − 1 91	49 30 91	− 1 96	28 95	N	s Q − 1 56	60 45 44	− 1 57	43 87	14 92				
	2954	− 6 50	S		8 8 44 23	− 1 95	42 28	S		8 49 58 75	− 1 54	57 21	11 14 93	m s 11 14 86	+ 0 011	+ 0 018	11 14 892
	2976	− 1 29	S		42 8 20	− 1 96	6 24	S		53 22 68	− 1 54	21 14	14 90				
	2978	+ 6 15	S		43 3 87	− 1 96	1 91	S		54 18 30	− 1 55	16 75	14 84				
	2987	− 3 2	S		44 17 93	− 1 95	15 98	S		55 32 30	− 1 54	30 76	14 78				
Feb 7	2799	+ 18 42	N	*I P W*	8 17 25 55	+ 1 95	27 50	N	*I P E*	8 28 40 88	+ 1 60	42 48	11 14 98	m s 11 14 9	+ 0 011	+ 0 043	11 15 009
	2810	+ 17 33	N	d c + 1 0	18 51 3	+ 1 95	5 48	N	d c + 0 5	30 6 84	+ 1 59	8 43	14 95				
	2863	+ 18 28	N	b + 0 2 *a* − 10 2	25 41 10	+ 1 95	43 05	N	b + 0 6 *a* + 0 8	36 56 41	+ 1 60	58 01	14 96				
	2867	+ 10 27	N	s Q + 1 90	7 2 69	+ 1 93	4 6	N	s Q + 1 57	38 17 96	+ 1 59	19 55	14 93				
	2883	− 31 9	S		8 28 8 39	+ 1 74	60 13	S		8 40 13 34	+ 1 62	14 96	11 14 83	m s 11 14 883	+ 0 011	+ 0 018	11 14 912
	2893	− 7 36	S		30 29 01	+ 1 84	0 85	S		41 44 09	+ 1 59	45 68	14 83				
	2901	+ 6 6	S		32 1 17	+ 1 89	14 06	S		43 27 40	+ 1 59	28 99	14 93				
	2911	+ 3 44	S		33 22 78	+ 1 88	4 66	S		44 38 01	+ 1 59	39 60	14 94				
	2965	+ 29 10	N	s Q − 1 90	8 40 27 45	− 1 79	25 66	N	Q − 1 57	8 51 42 16	− 1 54	40 62	11 14 96	m s 11 15 065	+ 0 011	+ 0 043	11 15 119
	3000	+ 28 41	N		46 16 67	− 1 79	14 88	N		57 31 51	− 1 55	29 96	15 08				
	3016	+ 31 0	N		47 56 81	− 1 78	5 0	N		59 11 69	− 1 53	10 16	15 13				
	3026	+ 28 21	N		49 9 31	− 1 79	7 52	N		60 44 16	− 1 55	42 61	15 09				
	2954	− 6 50	S		8 38 42 80	− 1 96	40 84	S		8 49 57 37	− 1 55	55 82	11 14 98	m s 11 14 953	+ 0 011	+ 0 018	11 14 982
	2976	− 1 29	S		42 6 81	− 1 94	4 87	S		53 21 34	− 1 55	19 79	14 92				
	2978	+ 6 15	S		43 2 40	− 1 91	0 49	S		54 16 98	− 1 55	15 43	14 94				
	2987	− 3	S		44 16 40	− 1 94	14 46	S		55 0 98	− 1 55	29 43	14 97				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MADRAS (E) *Lat* 13 4 *Long* 5h 21m 9 AND NAGARKOIL (W) *Lat* 8° 11 *Long* 5h 9m 50

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Heaviside with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Perl Equations $H_N - S_N = + 0\ 043$, $H_S - S_S = + 0\ 018$	$\Delta L + \rho$
1888					h m s	s	s			h m s	s	s	m s				
Feb 2	3129	+ 18 30	N	I P F	8 54 4 51	+ 1 84	26 35	N	I P E	9 5 39 83	+ 1 50	41 33	11 14 98	m s 11 14 9[illegible]	0 000	+ 0 043	11 1 021
	3170	+ 26 43	N	d c − 2 8	9 1 27 44	+ 1 83	29 27	N	d c + 1 5	12 4 [illegible]9	+ 1 44	44 23	14 9[illegible]				
	3194	+ 25 40	N	b − 1 3; a − 1 7	5 47 99	+ 1 83	49 83	N	b + 1 4; a + 24 4	17 3 3[illegible]	+ 1 45	4 8	15 00				
	3206	+ 0 16	N	s Q + 1 93	7 1 13	+ 1 85	13 98	N	s Q + 1 55	18 [illegible] 45	+ 1 50	8 95	14 97				
	3137	− 6 39	S		8 55 39 51	+ 1 83	41 34	S		9 6 54 4[illegible]	+ 1 [illegible]5	56 24	11 14 90	m s 11 14 89	0 000	+ 0 018	11 14 911
	3146	+ 2 47	S		57 1[illegible] 9	+ 1 83	19 22	S		8 3 4	+ 1 66	34 13	14 91				
	3160	− 5 53	S		59 5 1	+ 1 83	55 14	S		11 8 2[illegible]	+ 1 [illegible]5	10 02	14 88				
	3240	− 1 43	S		9 12 29 03	+ 1 83	30 86	S		3 44 03	+ 1 [illegible]1	45 [illegible]4	14 88				
	3278	+ 16 57	N	s Q − 1 93	9 19 40 68	− 2 04	38 64	N	Q − 1 55	9 30 55 21	− 1 57	53 64	11 15 00	m s 11 14 [illegible]5	0 000	+ 0 043	11 15 018
	3292	+ 20 48	N		21 26 49	− 2 03	24 46	N		3 41 08	− 1 61	39 4[illegible]	15 01				
	3317	+ 30 29	N		25 48 13	− 2 05	46 10	N		3 2 [illegible]6	− 1 [illegible]2	1 04	14 94				
	3327	+ 23 59	N		27 42 36	− 2 03	40 3	N		38 56 92	− 1 64	55 28	14 95				
	3271	− 5 25	S		9 17 46 3[illegible]	− 2 05	44 34	S		9 28 60 68	− 1 56	59 12	11 14 98	m s 11 14 962	0 000	+ 0 018	11 14 981
	3303	− 0 38	S		22 57 17	− 03	55 14	S		34 11 1	− 1 41	10 10	14 96				
	3312	+ 10 24	S		23 59 28	− 2 0	57 26	S		51 [illegible]9	− 1 51	12 28	15 0				
	3330	+ 2 16	S		29 25 81	− 2 03	23 [illegible]8	S		40 40 11	− 1 44	38 6[illegible]	14 89				
Feb 3	3129	+ 18 30	N	I P W	8 54 24 49	+ 1 [illegible]	26 6	N	I P E	9 5 39 95	+ 1 4	41 40	11 15 14	m s 11 1 1[illegible]0	0 000	+ 0 043	11 15 215
	3170	+ 26 43	N	d c − 4 0	9 1 27 40	+ 1 74	29 14	N	d c + 1 5	12 42 92	+ 1 38	44 30	15 16				
	3194	+ 25 40	N	b − 0 8; a + 10 6	5 47 93	+ 1 [illegible]4	49 67	N	b − 0 9; a + 4 4	17 3 45	+ 1 39	4 84	15 1				
	3206	+ 20 16	N	s Q + 1 92	7 12 05	+ 1 76	13 81	N	s Q + 1 55	18 27 58	+ 1 44	29 02	15 21				
	3137	− 6 39	S		8 55 39 26	+ 1 89	41 15	S		9 6 54 61	+ 1 [illegible]0	56 31	11 15 16	m s 11 15 198	0 000	+ 0 018	11 15 216
	3146	+ 2 47	S		57 17 19	+ 1 86	19 05	S		8 32 65	+ 1 61	34 26	15 21				
	3160	− 5 53	S		59 53 02	+ 1 89	54 91	S		11 8 41	+ 1 70	10 11	15 20				
	3240	− 1 43	S		9 12 28 [illegible]6	+ 1 8[illegible]	30 63	S		23 44 0	+ 1 65	45 85	15 2				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MADRAS (E) *Lat 13° 4, Long 5h 21m 9s* AND NAGARKOIL (W) *Lat 8° 11 Long 5h 9m 55s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Heaviside with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $H_N - S_N = + 0\ 043$, $H_S - S_S = + 0\ 018$	$\Delta L + \rho$
1888					h m s	s	s			h m s	s	s	m s				
Feb 3	3278	+ 16 57	N	*I P W*	9 19 40 67	−2 06	38 61	N	*I P E*	9 30 55 34	−1 62	53 72	11 15 11				
	3292	+ 20 48	N	d c − 4 0	21 26 50	−2 08	24 42	N	d c + 1 5	32 41 18	−1 66	39 52	15 10	m s 11 15 155	0 000	+ 0 043	11 15 198
	3317	+ 30 29	N	b − 0 8 a + 10 6	25 48 17	−2 13	46 04	N	b − 0 9 a + 24 4	37 2 96	−1 77	1 19	15 15				
	3327	+ 23 59	N	s Q − 1 92	27 42 23	−2 09	40 14	N	s Q − 1 55	38 57 09	−1 69	55 40	15 26				
	3271	− 5 25	S		9 17 46 24	−1 95	44 29	S		9 28 60 87	−1 41	59 46	11 15 17				
	3303	− 0 38	S		22 57 06	−1 97	55 09	S		34 11 67	−1 46	10 21	15 12	m s 11 15 128	0 000	+ 0 018	11 15 146
	3312	+ 10 24	S		23 59 21	−2 04	57 17	S		35 13 89	−1 56	12 33	15 16				
	3339	+ 2 16	S		29 25 70	−1 98	23 72	S		40 40 27	−1 49	38 78	15 06				
Feb 4	3129	+ 18 30	N	*I P W*	8 54 24 53	+1 77	26 30	N	*I P W*	9 5 39 82	+1 56	41 38	11 15 08				
	3170	+ 26 43	N	d c − 4 0	9 1 27 38	+1 77	29 15	N	d c + 1 7	12 4 78	+1 56	44 34	15 19	m s 11 15 148	0 000	+ 0 043	11 15 191
	3194	+ 25 40	N	b − 0 a + 0 8	5 47 94	+1 77	49 71	N	b − 0 8 a + 1 2	17 3 31	+1 56	4 87	15 16				
	3206	+ 20 16	N	s Q + 1 89	7 12 14	+1 76	13 90	N	s Q + 1 55	18 27 50	+1 56	29 06	15 16				
	3137	− 6 39	S		8 55 39 42	+1 80	41 22	S		9 6 54 75	+1 58	56 33	11 15 11				
	3146	+ 2 47	S		57 17 40	+1 79	19 19	S		8 32 67	+1 57	34 24	15 05	m s 11 15 090	0 000	+ 0 018	11 15 108
	3160	− 5 53	S		59 53 20	+1 80	55 00	S		11 8 53	+1 58	10 11	15 11				
	3278	+ 16 5	N	s Q − 1 89	9 19 40 65	−2 01	38 64	N	s Q − 1 55	9 30 55 31	−1 53	53 78	11 15 14				
	3292	+ 20 48	N		21 26 51	−2 01	24 50	N		32 41 07	−1 54	39 53	15 03	m s 11 15 135	0 000	+ 0 043	11 15 178
	3317	+ 30 29	N		25 48 04	−2 02	46 02	N		37 2 78	−1 54	1 24	15 22				
	3327	+ 23 59	N		27 42 31	−2 01	40 30	N		38 56 99	−1 54	55 45	15 15				
	3271	− 5 25	S		9 17 46 30	−1 99	44 31	S		9 8 60 91	−1 52	59 39	11 15 08				
	3303	− 0 38	S		22 57 11	−1 99	55 12	S		34 11 73	−1 53	10 20	15 08	m s 11 15 103	0 000	+ 0 018	11 15 121
	3312	+ 10 24	S		23 59 23	−2 00	57 23	S		35 13 87	−1 53	12 34	15 11				
	3339	+ 2 16	S		29 25 73	−1 99	23 74	S		40 40 41	−1 53	38 88	15 14				

MADRAS (L) *Lat* 13 4 *Long* 5^h 21^m 9 AND NAGARKOIL (W) *Lat* 8° 11 *Long* 5^h 9 55

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Heaviside with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constant	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Peral Equations $H_N - S_N = + 0\ 043$, $H_S - S_S = + 0\ 018$	$\Delta L + \rho$
1888					h m s	s	s			h m s	s	s	m s				
Feb 5	3129	+ 18 30	N	*I P E*	8 54 24 55	+ 1 83	26 38	N	*I P W*	9 5 [illegible] 73	+ 1 52	41 25	11 14 87				
	3170	+ 26 43	N	d c − 2 8	9 1 27 53	+ 1 8	9 35	N	d c − 2 3	12 4 [illegible]	+ 1 47	44 13	14 78	m s 11 14 8 0	0 000	+ 0 043	11 14 893
	3194	+ 25 40	N	b + 0 7 a + 6 4	5 48 01	+ 1 81	49 82	N	b + 2 7 a + 10 8	17 3 21	+ 1 48	4 69	14 87				
	3206	+ 20 16	N	s Q + 1 90	7 12 17	+ 1 83	14 00	N	s Q + 1 56	18 27 6	+ 1 52	28 88	14 88				
	3137	− 6 39	S		8 55 39 46	+ 1 85	41 35	S		9 6 54 55	+ 1 64	56 19	11 14 84				
	3146	+ 2 47	S		57 17 35	+ 1 88	19 23	S		8 32 5	+ 1 59	34 12	14 89	m s 11 14 868	0 000	+ 0 018	11 14 886
	3160	− 5 53	S		59 53 18	+ 1 88	55 06	S		11 8 35	+ 1 63	9 98	14 92				
	3240	− 1 43	S		9 12 28 99	+ 1 88	30 87	S		23 44 0	+ 1 62	45 69	14 82				
	3278	+ 16 57	N	s Q − 1 90	9 19 40 62	− 1 96	38 66	N	s Q − 1 56	9 30 55 14	− 1 58	53 56	11 14 90				
	3292	+ 20 48	N		21 6 4	− 1 97	24 46	N		32 41 00	− 1 61	39 39	14 93	m s 11 14 883	0 000	+ 0 043	11 14 9 6
	3317	+ 30 29	N		25 48 20	− 00	46 20	N		37 2 66	− 1 67	0 99	14 79				
	3327	+ 23 59	N		27 42 31	− 1 98	40 33	N		38 56 87	− 1 63	55 24	14 91				
	3271	− 5 25	S		9 17 46 8	− 1 9	44 36	S		9 28 60 80	− 1 49	59 31	11 14 95				
	3303	− 0 38	S		22 56 92	− 1 92	55 00	S		34 [illegible] 54	− 1 51	10 03	15 03	m s 11 14 9 5	0 000	+ 0 018	11 14 993
	3312	+ 10 24	S		23 59 12	− 1 96	57 16	S		35 13 78	− 1 55	12 23	15 07				
	3330	+ 2 16	S		2 25 79	− 1 92	23 87	S		40 40 24	− 1 52	38 72	14 85				
Feb 6	3129	+ 18 30	N	*I P L*	8 54 24 63	+ 1 85	26 48	N	*I P E*	9 5 39 79	+ 1 53	41 32	11 14 84				
	3170	+ 26 43	N	d c − 2 8	9 1 27 52	+ 1 81	29 33	N	d c − 0 5	12 42 80	+ 1 49	44 29	14 96	m s 11 14 920	− 0 001	+ 0 043	11 14 962
	3194	+ 25 40	N	b + 1 1 a + 9 9	5 48 07	+ 1 81	49 88	N	b + 0 9 a + 9 4	17 3 34	+ 1 49	4 83	14 95				
	3206	+ 20 16	N	s Q + 1 91	7 12 18	+ 1 84	14 02	N	s Q + 1 56	18 27 43	+ 1 52	28 95	14 93				
	3137	− 6 39	S		8 55 39 40	+ 1 94	41 34	S		9 6 54 67	+ 1 63	56 30	11 14 96				
	3146	+ 2 47	S		57 17 38	+ 1 90	19 28	S		8 32 67	+ 1 59	34 26	14 98	m s 11 14 978	− 0 001	+ 0 018	11 14 995
	3160	− 5 53	S		59 53 14	+ 1 93	55 07	S		11 8 45	+ 1 61	10 06	14 99				
	3240	− 1 43	S		9 12 28 89	+ 1 92	30 81	S		23 44 18	+ 1 61	45 79	14 98				

 TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MADRAS (E) *Lat* 13° 4 *Long* 5ʰ 21ᵐ 9 AND NAGARKOIL (W) *Lat* 8° 11 *Long* 5ʰ 9ᵐ 55

Astronomical Date	Star		Transits Observed at E, By Heaviside with Telescope No 1					Transits Observed at W, By Strahan with Telescope No 2					Difference of Corrected Times (W − E)		Correction for Rate of W Clock	Corrns for Persl. Equations $H_N - S_N = +0\ 043$, $H_S - S_S = +0\ 018$	$\Delta L + \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1888		°			h m s	s	s			h m s	s	s	m s				
Feb 6	3278	+ 16 57	N	*I P E*	9 19 40 74	− 1 97	38 77	N	*I P E*	9 30 55 31	− 1 58	53 73	11 14 96	m s 11 14 975	− 0 001	+ 0 043	11 15 017
	3292	+ 20 48	N	d c − 2 8 b + 1 1 a + 9 9	21 26 56	− 1 98	24 58	N	d c − 0 5 b + 0 9 a + 9 4	32 41 12	− 1 60	39 52	14 94				
	3317	+ 30 29	N		25 48 25	− 2 03	46 22	N		37 2 84	− 1 64	1 20	14 98				
	3327	+ 23 59	N	s Q − 1 91	27 42 36	− 2 00	40 36	N	s Q − 1 56	38 57 00	− 1 62	55 38	15 02				
	3271	− 5 25	S		9 17 46 27	− 1 89	44 38	S		9 28 60 90	− 1 50	59 40	11 15 02	m s 11 15 038	− 0 001	+ 0 018	11 15 055
	3303	− 0 38	S		22 57 12	− 1 91	55 21	S		34 11 68	− 1 52	10 16	14 95				
	3312	+ 10 24	S		23 59 19	− 1 96	57 23	S		35 13 88	− 1 56	12 32	15 09				
	3339	+ 2 16	S		29 25 65	− 1 92	23 73	S		40 40 34	− 1 52	38 82	15 09				
													s				
Feb 7	3129	+ 18 30	N	*I P W*	8 54 24 51	+ 1 93	26 44	N	*I P E*	9 5 39 94	+ 1 55	41 49	11 15 05	m s 11 15 133	− 0 001	+ 0 043	11 15 175
	3170	+ 26 43	N	d c + 1 0 b + 0 2 a − 3 1	9 1 27 44	+ 1 95	29 39	N	d c + 0 5 b + 0 6 a + 13 2	12 42 94	+ 1 50	44 44	15 05				
	3194	+ 25 40	N		5 47 89	+ 1 94	49 83	N		17 3 51	+ 1 52	5 03	15 20				
	3206	+ 20 16	N	s Q + 1 90	7 11 99	+ 1 95	13 94	N	s Q + 1 57	18 27 63	+ 1 54	29 17	15 23				
	3137	− 6 39	S		8 55 39 32	+ 1 89	41 21	S		9 6 54 76	+ 1 66	56 42	11 15 21	m s 11 15 175	− 0 001	+ 0 018	11 15 192
	3146	+ 2 47	S		57 17 21	+ 1 91	19 12	S		8 32 73	+ 1 62	34 35	15 23				
	3160	− 5 53	S		59 53 08	+ 1 89	54 97	S		11 8 54	+ 1 66	10 20	15 23				
	3240	− 1 43	S		9 12 29 05	+ 1 90	30 95	S		23 44 34	+ 1 64	45 98	15 03				
	3278	+ 16 57	N	s Q − 1 90	9 19 40 63	− 1 86	38 77	N	s Q − 1 57	9 30 55 46	− 1 60	53 86	11 15 09	m s 11 15 085	− 0 001	+ 0 043	11 15 127
	3292	+ 20 48	N		21 26 43	− 1 85	24 58	N		32 41 24	− 1 61	39 63	15 05				
	3317	+ 30 29	N		25 48 03	− 1 83	46 20	N		37 2 99	− 1 67	1 32	15 12				
	3327	+ 23 59	N		27 42 30	− 1 84	40 46	N		38 57 17	− 1 63	55 54	15 08				
	3271	− 5 25	S		9 17 46 30	− 1 89	44 41	S		9 28 61 07	− 1 47	59 60	11 15 19	m s 11 15 155	− 0 001	+ 0 018	11 15 172
	3303	− 0 38	S		22 57 08	− 1 90	55 18	S		34 11 88	− 1 51	10 37	15 19				
	3312	+ 10 24	S		23 59 23	− 1 88	57 5	S		35 14 02	− 1 56	12 46	15 11				
	3339	+ 2 16	S		29 25 77	− 1 89	23 88	S		40 40 53	− 1 52	39 01	15 13				

OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL − ρ

NAGARKOIL (E) *Lat* 8° 11 *Long* 5h 9m 55 AND MANGALORE (W) *Lat* 12° 52 *Long* 4h 59m 33

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Heaviside with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Peral Equations $S_N - H_N = -0^s.043$, $S_S - H_S = -0.018$	ΔL − ρ
1888					h m s	s	s			h m s	s	s	m s				
Feb 18	3129	+ 18 30	N	*I P E*	9 5 36 28	+1 52	37 80	N	*I P E*	9 15 57 30	+1 64	58 94	10 21 14	m s 10 21 180	+ 0 001	− 0 043	10 21 138
	3170	+ 26 43	N	d c + 1 2	12 39 33	+1 47	40 80	N	d c − 1 3	23 0 25	+1 70	1 95	21 15				
	3194	+ 25 40	N	b − 0 3 a + 12 3	16 59 83	+1 48	61 31	N	b − 0 9 a − 18 0	25 20 84	+1 70	22 54	21 23				
	3206	+ 20 16	N	s Q + 1 55	18 23 95	+1 51	25 46	N	s Q + 1 65	28 45 01	+1 65	46 66	21 20				
	3137	− 6 39	S		9 6 51 10	+1 65	52 75	S		9 17 12 44	+1 47	13 91	10 21 16	m s 10 21 148	+ 0 001	− 0 018	10 21 131
	3146	+ 2 4[illegible]	S		8 29 06	+1 60	30 66	S		18 50 29	+1 53	51 82	21 16				
	3160	− 5 53	S		11 4 94	+1 63	6 57	S		21 26 23	+1 48	27 71	21 14				
	3240	− 1 43	S		23 40 69	+1 61	42 30	S		34 1 93	+1 50	3 43	21 13				
	3278	+ 16 57	N	s Q − 1 55	9 30 51 77	−1 57	50 20	N	s Q − 1 65	9 41 12 99	−1 67	11 32	10 21 12	m s 10 21 145	+ 0 001	− 0 043	10 21 103
	3292	+ 20 48	N		32 37 59	−1 59	36 00	N		42 58 78	−1 64	57 14	21 14				
	331[illegible]	+ 30 29	N		36 59 30	−1 65	57 65	N		45 20 38	−1 56	18 82	21 17				
	3327	+ 23 59	N		38 53 50	−1 62	51 88	N		49 14 65	−1 62	13 03	21 15				
	3271	− 5 25	S		9 28 57 41	−1 46	55 95	S		9 39 18 80	−1 82	16 98	10 21 03	m s 10 21 07[illegible]	+ 0 001	− 0 018	10 21 056
	3303	− 0 38	S		34 8 17	−1 50	6 67	S		44 29 57	−1 79	27 78	21 11				
	3312	+ 10 24	S		35 10 38	−1 54	8 84	S		45 31 61	−1 72	29 89	21 05				
	3339	+ 2 18	S		40 36 84	−1 50	35 34	S		50 58 21	−1 77	56 44	21 10				
Feb 19	3129	+ 18 30	N	*I P W*	9 5 36 17	+1 55	37 72	N	*I P F*	9 15 57 21	+1 62	58 83	10 21 11	m s 10 21 063	+ 0 001	− 0 043	10 21 021
	3194	+ 25 40	N	d c − 1 0	16 59 71	+1 58	61 29	N	d c − 1 3	25 20 67	+1 68	22 35	21 06				
	3206	+ 20 16	N	b + 0 5 a − 5 7 s Q + 1 55	18 23 91	+1 57	25 48	N	b − 0 8 a − 18 7 s Q + 1 63	28 44 86	+1 64	46 50	21 02				
	3160	− 5 53	S		9 11 4 97	+1 51	6 48	S		9 21 26 09	+1 45	27 54	10 21 06	m s 10 21 060	+ 0 001	− 0 018	10 21 043

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

NAGARKOIL (E) *Lat 8° 11 Long 5ʰ 9ᵐ 55* AND MANGALORE (W) *Lat 12° 52′ Long 4ʰ 59ᵐ 33ˢ*

Astronomical Date	Star		Transits Observed at E *By Strahan with Telescope No 2*				Transits Observed at W *By Heaviside with Telescope No 1*						Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns for Persl Equations $S_N - H_N = -0^s\ 043$, $S_S - H_S = -0\ 018$	$\Delta L - \rho$
	B A C Number	Declination	Star Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Stars Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1888					h m s	s	s			h m s	s	s	m s	m s			
Feb 19	32,8	+ 16 5,	N	*I P W* d c − 1 0 b + 0 5 a − 5 7 Q − 1 55 s	9 30 51 72	−1 55	50 17	N	*I P I* d c − 1 3 b − 0 8 a − 18 7 Q − 1 63 s	9 41 12 90	−1 65	11 25	10 21 08	10 21 073	+ 0 001	− 0 043	10 21 031
	3317	+ 30 29	N		36 59 13	−1 51	57 62	N		47 20 28	−1 54	18 74	21 12				
	3327	+ 23 59	N		38 53 43	−1 51	51 92	N		49 14 54	−1 60	12 94	21 02				
	3271	− 5 25	S		9 28 57 45	−1 59	55 86	S		9 39 18 70	−1 81	16 89	10 21 03	10 21 0 0	+ 0 001	− 0 018	10-21 013
Feb 22	3129	+ 18 30	N	*I P T* d + 0 2 b + 1 6 a − 1 7 Q + 1 59 s	9 5 37 71	+1 65	39 36	N	*I P W* d c − 0 5 b + 0 3 a − 16 6 Q + 1 61 s	9 15 58 87	+1 65	60 52	10 21 16	10 21 135	− 0 001	− 0 043	10 1 091
	3170	+ 26 43	N		12 40 62	+1 65	42 27	N		23 1 71	+1 71	3 42	21 15				
	3194	+ 25 40	N		17 1 20	+1 65	2 85	N		27 22 28	+1 69	23 97	21 12				
	3206	+ 20 16	N		18 25 36	+1 65	27 01	N		28 46 46	+1 66	48 12	21 11				
	3137	− 6 39	S		9 6 52 59	+1 60	54 19	S		9 17 13 96	+1 48	15 44	10 21 25	10 1 203	− 0 001	− 0 018	10 21 184
	3146	+ 2 47	S		8 30 50	+1 62	32 12	S		18 51 81	+1 54	53 35	21 23				
	3160	− 5 53	S		11 6 42	+1 61	8 03	S		21 27 71	+1 48	29 19	21 16				
	3240	− 1 43	S		23 42 20	+1 62	43 82	S		34 3 49	+1 50	4 99	21 17				
	3278	+ 16 57	N	Q − 1 59 s	9 30 53 25	−1 53	51 72	N	Q − 1 61 s	9 41 14 52	−1 59	12 93	10 21 21	10 21 225	− 0 001	− 0 043	10 21 181
	3292	+ 20 48	N		32 39 01	−1 53	37 48	N		42 60 23	−1 55	58 68	21 20				
	3317	+ 30 29	N		36 60 65	−1 52	59 13	N		47 21 87	−1 48	20 39	21 26				
	3327	+ 23 59	N		38 54 92	−1 53	53 39	N		49 16 16	−1 54	14 62	21 23				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

NAGARKOIL (E) *Lat 8° 11 Long 5h 9m 55* AND MANGALORE (W) *Lat 12° 52′ Long 4h 59m 33s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Heaviside with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Persl Equations $S_N - H_N = -0.043$, $S_S - H_S = -0.018$	$\Delta L - \rho$
1888					h m s	s	s			h m s	s	s	m s	m s			
Feb 22	3271	− 5 25	S	*I P E*	9 28 58 91	−1 57	57 34	S	*I P W*	9 39 20 33	−1 73	18 60	10 21 26	10 21 208	− 0 001	− 0 018	10 21 189
	3303	− 0 38	S	d c + 0 2	34 9 13	−1 57	8 16	S	d c − 0 5	44 31 05	−1 71	29 34	21 18				
	3312	+ 10 24	S	b + 1 6 a − 1 7	35 11 83	−1 54	10 29	S	b + 0 3 a −16 6	45 33 08	−1 63	31 45	21 16				
	3339	+ 2 18	S	s Q − 1 59	40 38 36	−1 56	36 80	S	s Q − 1 61	50 59 72	−1 69	58 03	21 23				
Feb 24	3129	+ 18 30	N	*I P W*	9 5 37 92	+1 70	39 62	N	*I P W*	9 15 59 03	+1 71	60 74	10 21 12	10 21 145	− 0 001	− 0 043	10 21 101
	3170	+ 26 43	N	d c + 2 0	12 40 84	+1 72	42 56	N	d c − 8 5	23 1 95	+1 76	3 71	21 15				
	3194	+ 25 40	N	b + 2 2 a − 3 5	17 1 39	+1 72	3 11	N	b + 0 9 a −15 9	27 22 53	+1 75	24 28	21 17				
	3206	+ 20 16	N	s Q + 1 59	18 25 57	+1 70	27 27	N	s Q + 1 66	28 46 69	+1 72	48 41	21 14				
	3137	− 6 39	S		9 6 52 91	+1 67	54 58	S		9 17 14 14	+1 55	15 69	10 21 11	10 21 133	− 0 001	− 0 018	10 21 114
	3146	+ 2 47	S		8 30 80	+1 67	32 47	S		18 51 97	+1 60	53 57	21 10				
	3160	− 5 53	S		11 6 66	+1 67	8 33	S		21 27 90	+1 56	29 46	21 13				
	3240	− 1 43	S		23 42 42	+1 68	44 10	S		34 3 71	+1 58	5 29	21 19				
	3278	+ 16 57	N	s Q − 1 59	9 30 53 45	−1 49	s 51 96	N	s Q − 1 66	9 41 14 73	−1 63	13 10	10 21 14	10 21 123	− 0 001	− 0 043	10 21 079
	3292	+ 20 48	N		32 39 26	−1 47	37 79	N		42 60 49	−1 59	58 90	21 11				
	3317	+ 30 29	N		36 60 95	−1 46	59 49	N		47 22 13	−1 54	20 59	21 10				
	3327	+ 23 59	N		38 55 16	−1 47	53 69	N		49 16 40	−1 57	14 83	21 14				
	3271	− 5 25	S		9 28 59 17	−1 51	57 66	S		9 39 20 52	−1 76	18 76	10 21 10	10 21 130	− 0 001	− 0 018	10 21 111
	3303	− 0 38	S		34 9 98	−1 51	8 47	S		44 31 33	−1 74	29 59	21 12				
	3312	+ 10 24	S		35 12 06	−1 48	10 58	S		45 33 35	−1 67	31 68	21 10				
	3339	+ 2 18	S		40 38 58	−1 51	37 07	S		50 59 99	−1 72	58 27	21 20				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

NAGARKOIL (E) *Lat 8° 11', Long 5h 9m 55s*; AND MANGALORE (W) *Lat. 12° 52', Long 4h 59m 33s*.

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Heavside, with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $S_N - H_N = -0^s.043$, $S_S - H_S = -0.018$	$\Delta L + \rho$
1888		°			h m s	s	s			h m s	s	s	m s				
Feb 18	3475	+ 13 54	N	*I P E*	9 56 7 56	+1 54	9 10	N	*I P E*	10 6 28 74	+1 61	30 35	10 21 25	m s 10 21 253	+ 0 016	− 0 043	10 21 226
	3485	+ 21 44	N	d c + 1 2	58 50 65	+1 51	52 16	N	d c − 1 3	9 11 74	+1 66	13 40	21 24				
	3500	+ 29 52	N	b − 0 3, a + 12 3	10 0 23 47	+1 45	24 92	N	b − 0 9, a − 18 0	10 44 46	+1 73	46 19	21 27				
	3511	+ 23 40	N	s Q + 1 55	1 35 66	+1 49	37 15	N	s Q + 1 65	11 56 72	+1 68	58 40	21 25				
	3449	+ 6 10	S		9 51 26 74	+1 58	28 32	S		10 1 48 01	+1 56	49 57	10 21 25	m s 10 21 243	+ 0 016	− 0 018	10 21 241
	3458	+ 0 11	S		52 43 09	+1 61	44 70	S		3 4 42	+1 52	5 94	21 24				
	3470	− 7 51	S		55 4 47	+1 66	6 13	S		5 25 91	+1 46	27 37	21 24				
	3579	+ 14 55	N	s Q − 1 55	10 13 23 16	−1 56	21 60	N	s Q − 1 65	10 23 44 46	−1 69	42 77	10 21 17	m s 10 21 190	+ 0 016	− 0 043	10 21 163
	3606	+ 14 43	N		16 46 90	−1 56	45 34	N		27 8 20	−1 69	6 51	21 17				
	3643	+ 16 43	N		23 27 91	−1 58	26 33	N		33 49 26	−1 67	47 59	21 26				
	3650	+ 28 7	N		24 42 96	−1 64	41 32	N		35 4 06	−1 58	2 48	21 16				
	3568	− 16 16	S		10 11 14 43	−1 41	13 02	S		10 21 36 06	−1 91	34 15	10 21 13	m s 10 21 135	+ 0 016	− 0 018	10 21 133
	3596	− 29 6	S		14 52 83	−1 34	51 49	S		25 14 61	−2 02	12 59	21 10				
	3628	+ 7 37	S		20 47 72	−1 52	46 20	S		31 9 08	−1 74	7 34	21 14				
	3637	− 12 48	S		22 35 38	−1 42	33 96	S		32 57 01	−1 88	55 13	21 17				
Feb 19	3475	+ 13 54	N	*I P W*	9 56 5 42	+1 54	6 96	N	*I P E*	10 6 26 56	+1 59	28 15	10 21 19	m s 10 21 180	+ 0 017	− 0 043	10 21 154
	3485	+ 21 44	N	d c − 1 0, b + 0 5, a − 5 7, s Q + 1 55	58 48 48	+1 58	50 06	N	d c − 1 3, b − 0 8, a − 18 7, s Q + 1 63	9 9 58	+1 65	11 23	21 17				
	3449	+ 6 10	S		9 51 24 72	+1 54	26 26	S		10 1 45 93	+1 53	47 46	10 21 20	m s 10 21 153	+ 0 017	− 0 018	10 21 152
	3458	+ 0 11	S		52 41 11	+1 52	42 63	S		3 2 29	+1 49	3 78	21 15				
	3521	− 28 26	S		10 3 28 95	+1 44	30 39	S		13 50 24	+1 26	51 50	21 11				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

NAGARKOIL (E) *Lat* 8° 11 *Long* 5h 9m 55s : AND MANGALORE (W) *Lat* 12° 52′, *Long* 4h 59m 38s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl Equations $S_N - H_N = -0\ 043$, $S_S - H_S = -0\ 018$	$\Delta L + \rho$
1888		° ′			h m s	s	s			h m s	s	s	m s	m s			
Feb 19	3579	+ 14 55	N	*I P W*	10 13 21 07	− 1 53	19 54	N	*I P E*	10 23 42 34	− 1 67	40 67	10 21 13	10 21 060	+ 0 017	− 0 043	10 21 034
	3606	+ 14 43	N	d c − 1 0 b + 0 5 a − 5 7 s Q − 1 55	16 44 89	− 1 56	43 33	N	d c − 1 3 b − 0 8 a − 18 7 s Q − 1 63	27 5 99	− 1 67	4 32	20 99				
	3568	− 16 16	S		10 11 12 59	− 1 62	10 97	S		10 21 33 98	− 1 89	32 09	10 21 12	10 21 050	+ 0 017	− 0 018	10 21 049
	3596	− 29 6	S		14 51 10	− 1 66	49 44	S		25 12 41	− 1 99	10 42	20 98				
Feb. 20	3475	+ 13 54	N	*I P W*	9 56 2 98	+ 1 59	4 57	N	*I P W*	10 6 24 14	+ 1 64	25 78	10 21 21	10 21 193	+ 0 019	− 0 043	10 21 169
	3485	+ 21 44	N	d c + 1 0	58 46 01	+ 1 61	47 62	N	d c − 0 5	9 7 19	+ 1 68	8 87	21 25				
	3500	+ 29 52	N	b − 0 4 a − 7 0 s Q + 1 56	10 0 18 80	+ 1 65	20 45	N	b + 0 7 a − 12 1 s Q + 1 62	10 39 85	+ 1 72	41 57	21 12				
	3449	+ 6 10	S		9 51 22 26	+ 1 56	23 82	S		10 1 43 42	+ 1 60	45 02	10 21 20	10 21 180	+ 0 019	− 0 018	10 21 181
	3458	+ 0 11	S		52 38 65	+ 1 54	40 19	S		2 59 80	+ 1 57	61 37	21 18				
	3521	− 28 26	S		10 3 26 46	+ 1 47	27 93	S		13 47 68	+ 1 41	49 09	21 16				
	3579	+ 14 55	N	s Q − 1 56	10 13 18 62	− 1 53	17 09	N	s Q − 1 62	10 23 39 88	− 1 60	38 28	10 21 19	10 21 233	+ 0 019	− 0 043	10 21 209
	3606	+ 14 43	N		16 42 29	− 1 53	40 76	N		27 3 62	− 1 60	2 02	21 26				
	3643	+ 16 43	N		23 23 30	− 1 52	21 78	N		33 44 64	− 1 61	43 03	21 25				
	3568	− 16 16	S		10 11 10 03	− 1 62	8 41	S		10 21 31 41	− 1 74	29 67	10 21 26	10 21 228	+ 0 019	− 0 018	10 21 229
	3596	− 29 6	S		14 48 57	− 1 65	46 92	S		25 9 97	− 1 83	8 14	21 22				
	3628	+ 7 37	S		20 43 20	− 1 55	41 65	S		31 4 46	− 1 64	2 82	21 17				
	3637	− 12 48	S		22 30 94	− 1 61	29 33	S		32 52 33	− 1 74	50 59	21 26				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

NAGARKOIL (E) *Lat 8 11 Long 5h 9m 55s* ; AND MANGALORE (W) *Lat 12 52′ Long 4h 59m 33s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $S_N - H_N = -0\ 043$, $S_S - H_S = -0\ 018$	$\Delta L + \rho$
1888		°			h m s	s	s			h m s	s	s	m s				
Feb 21	3475	+ 13 54	N	*I P E*	9 56 0 32	+1 56	1 88	N	*I P W*	10 6 21 44	+1 61	23 05	10 21 17	m s 10 21 273	+ 0 020	− 0 043	10 21 250
	3485	+ 21 44	N	d c + 2 2	58 43 34	+1 57	44 91	N	d c − 0 5	9 4 48	+1 66	6 14	21 23				
	3500	+ 29 52	N	b − 2 2 a − 2 6	10 0 16 04	+1 56	17 60	N	b 0 0 a − 19 2	10 37 19	+1 74	38 93	21 33				
	3511	+ 23 40	N	s Q + 1 54	1 28 30	+1 56	29 86	N	s Q + 1 61	11 49 53	+1 69	51 22	21 36				
	3449	+ 6 10	S		9 51 19 54	+1 53	21 07	S		10 1 40 80	+1 55	42 35	10 21 28	m s 10 21 260	+ 0 020	− 0 018	10 21 262
	3458	+ 0 11	S		52 35 92	+1 52	37 44	S		2 57 20	+1 51	58 71	21 27				
	3470	− 7 51	S		54 57 35	+1 52	58 87	S		5 18 70	+1 45	20 15	21 28				
	3521	− 28 26	S		10 3 23 70	+1 52	25 22	S		13 45 16	+1 27	46 43	21 21				
	3579	+ 14 55	N	s Q − 1 54	10 13 15 88	−1 52	14 36	N	s Q − 1 61	10 23 37 24	−1 60	35 64	10 21 28	m s 10 21 278	+ 0 020	− 0 043	10 21 255
	3606	+ 14 43	N		16 39 56	−1 52	38 04	N		27 0 95	−1 62	59 33	21 29				
	3643	+ 16 43	N		23 20 63	−1 51	19 12	N		33 41 94	−1 59	40 35	21 23				
	3650	+ 28 7	N		24 35 49	−1 51	33 98	N		34 56 79	−1 50	55 29	21 31				
	3568	− 16 16	S		10 11 7 30	−1 56	5 74	S		10 21 28 87	−1 84	27 03	10 21 29	m s 10 21 240	+ 0 020	− 0 018	10 21 242
	3596	− 29 6	S		14 45 77	−1 56	44 21	S		25 7 40	−1 95	5 45	21 24				
	3628	+ 7 37	S		20 40 46	−1 53	38 93	S		31 1 78	−1 66	0 12	21 19				
	3637	− 12 48	S		22 28 18	−1 55	26 63	S		32 49 68	−1 81	47 87	21 24				
Feb 22	3475	+ 13 54	N	*I P E*	9 55 57 45	+1 65	59 10	N	*I P W*	10 6 18 71	+1 62	20 33	10 21 23	m s 10 21 240	+ 0 020	− 0 043	10 21 217
	3485	+ 21 44	N	d c + 0 2	58 40 52	+1 65	42 17	N	d c − 0 5	9 1 77	+1 66	3 43	21 26				
	3500	+ 29 52	N	b + 1 6 a − 1 7	10 0 13 27	+1 66	14 93	N	b + 0 3 a − 16 6	10 34 43	+1 73	36 16	21 23				
				s Q + 1 59					s Q + 1 61								
	3458	+ 0 11	S		9 52 33 08	+1 61	34 69	S		10 2 54 40	+1 53	55 93	10 21 24	m s 10 21 227	+ 0 020	− 0 018	10 21 229
	3470	− 7 51	S		54 54 55	+1 61	56 16	S		5 15 87	+1 47	17 34	21 18				
	3521	− 28 26	S		10 3 20 84	+1 60	22 44	S		13 42 38	+1 32	43 70	21 26				

NAGARKOIL (E) *Lat* 8° 11′ *Long* 5h 9m 55s AND MANGALORE (W) *Lat* 12° 52′ *Long* 4h 59m 33s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	In strumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heavnside with Telescope No 1): Star's Aspect	In strumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Perl Equations $S_N - H_N = -0^s\,043$, $S_S - H_S = -0\,018$	$\Delta L + \rho$
					h m s	s	s			h m s	s	s	m s	m s			
1888 Feb 22	3579	+ 14 55	N	*I P E*	10 13 13 11	− 1 53	11 58	N	*I P W*	10 23 34 49	− 1 60	32 89	10 21 31				
	3606	+ 14 43	N	d c + 0 2	16 36 82	− 1 53	35 29	N	d c − 0 5	26 58 23	− 1 61	56 62	21 33	10 21 317	+ 0 020	− 0 043	10 21 294
	3650	+ 28 7	N	b + 1 6 a − 1 7	24 32 72	− 1 53	31 19	N	b + 0 3 a − 16 6	34 54 01	− 1 51	52 50	21 31				
				Q − 1 59 s					Q − 1 61 s								
	3568	− 16 16	S		10 11 4 55	− 1 58	2 97	S		10 21 26 05	− 1 ,9	24 26	10 21 29				
	3596	− 29 6	S		14 43 00	− 1 58	41 42	S		25 4 59	− 1 89	2 70	21 28	10 21 287	+ 0 020	− 0 018	10 21 289
	3628	+ 7 37	S		20 37 70	− 1 56	36 14	S		30 59 09	− 1 66	57 43	21 29				
Feb 24	3475	+ 13 54	N	*I P W*	9 55 52 08	+ 1 69	53 77	N	*I P W*	10 6 13 34	+ 1 68	15 02	10 21 25				
	3485	+ 21 44	N	d c + 2 0	58 36 72	+ 0 12*	36 84	N	d c − 0 5	8 56 34	+ 1 73	58 07	21 23	10 21 243	+ 0 019	− 0 043	10 21 219
	3500	+ 29 52	N	b + 2 2 a − 3 5	10 0 9 43	+ 0 13*	9 56	N	b + 0 9 a − 15 9	10 29 03	+ 1 78	30 81	21 25				
				Q + 1 59 s					Q + 1 66 s								
	3449	+ 0 10	S		9 51 11 33	+ 1 68	13 01	S		10 1 32 66	+ 1 63	34 29	10 21 28				
	3458	+ 0 11	S		52 27 70	+ 1 67	29 37	S		2 49 02	+ 1 59	50 61	21 24	10 21 218	+ 0 019	− 0 018	10 21 219
	3470	− 7 51	S		54 49 14	+ 1 67	50 81	S		5 10 46	+ 1 55	12 01	21 20				
	3521	− 28 26	S		10 3 15 56	+ 1 63	17 19	S		13 36 93	+ 1 41	38 34	21 15				
	3579	+ 14 55	N	Q − 1 59 s	10 13 7 78	− 1 49	6 29	N	Q − 1 66 s	10 23 29 09	− 1 64	27 45	10 21 16				
	3606	+ 14 43	N		16 31 48	− 1 48	30 00	N		26 52 ,8	− 1 64	51 14	21 14	10 21 165	+ 0 019	− 0 043	10 21 141
	3643	+ 16 43	N		23 12 48	− 1 48	11 00	N		33 33 82	− 1 63	32 19	21 19				
	3650	+ 28 7	N		24 27 40	− 1 46	25 94	N		34 48 66	− 1 55	47 11	21 17				
	3568	− 16 16	S		10 10 59 19	− 1 52	5, 67	S		10 21 20 64	− 1 82	18 82	10 21 15				
	3596	− 29 6	S		14 37 68	− 1 55	36 13	S		24 59 20	− 1 92	57 28	21 15	10 21 150	+ 0 019	− 0 018	10 21 151
	3637	− 12 48	S		22 20 12	− 1 52	18 60	S		32 41 56	− 1 81	39 75	21 15				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

MADRAS (E) *Lat* 13° 4, *Long* 5h 21m 9s AND MANGALORE (W) *Lat* 12° 52′, *Long* 4h 59m 33s

Astronomical Date	Star		Transits Observed at E *By Strahan with Telescope No 2*					Transits Observed at W *By Heaviside with Telescope No 1*					Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns for Persl Equations $S_E - H_W = -0.043$ $S_E - H_E = -0.018$	$\Delta L - \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1888					h m s	s	s			h m s	s	s	m s				
Mar 5	3278	+ 16 57	N	*I P E*	9 30 51 35	+ 1 76	53 11	N	*I P W*	9 52 27 64	+ 1 54	29 18	21 36 07	m s 21 36 053	− 0 014	− 0 043	21 35 996
	3292	+ 20 48	N	d c + 1 3	32 37 04	+ 1 90	38 94	N	d c − 2 8	54 13 43	+ 1 53	14 96	36 02				
	3317	+ 30 29	N	b + 0 5 a − 90 6	36 58 27	+ 2 31	60 58	N	b − 0 2 a + 4 2	58 35 13	+ 1 52	36 65	36 07				
	3327	+ 23 59	N	s Q + 1 57	38 52 77	+ 2 03	54 80	N	s Q + 1 63	10 0 29 32	+ 1 53	30 85	36 05				
	3271	− 5 25	S		9 28 57 87	+ 0 97	58 84	S		9 50 33 16	+ 1 60	34 76	21 35 92	m s 21 35 990	− 0 014	− 0 018	21 35 958
	3303	− 0 38	S		34 8 45	+ 1 13	9 58	S		55 43 94	+ 1 59	45 53	35 95				
	3339	+ 2 18	S		40 36 91	+ 1 23	38 14	S		10 2 12 65	+ 1 59	14 24	36 10				
	3409	+ 30 11	N	s Q − 1 57	9 53 10 85	− 0 84	10 01	N	s Q − 1 63	10 14 47 72	− 1 74	45 98	21 35 97	m s 21 36 038	− 0 014	− 0 043	21 35 981
	3416	+ 32 29	N		54 35 32	− 0 73	34 59	N		16 12 42	− 1 74	10 68	36 09				
	3423	+ 22 29	N		56 36 73	− 1 16	35 57	N		18 13 41	− 1 73	11 68	36 11				
	3475	+ 13 55	N		10 5 39 76	− 1 50	38 26	N		27 15 94	− 1 70	14 24	35 98				
	3440	+ 6 10	S		10 0 59 10	− 1 78	57 32	S		10 22 35 08	− 1 68	33 40	21 36 08	m s 21 36 047	− 0 014	− 0 018	21 36 015
	3458	+ 0 11	S		2 15 70	− 1 99	13 71	S		23 51 44	− 1 67	49 77	36 06				
	3470	− 7 51	S		4 37 46	− 2 26	35 20	S		26 12 86	− 1 66	11 20	36 00				
Mar 7	3278	+ 16 57	N	*I P W*	9 30 53 24	+ 1 62	54 86	N	*I P W*	9 52 29 60	+ 1 54	31 14	21 36 28	m s 21 36 240	− 0 016	− 0 043	21 36 181
	3292	+ 20 48	N	d c − 0 1	32 39 03	+ 1 65	40 68	N	d c − 2 8	54 15 37	+ 1 53	16 90	36 22				
	3317	+ 30 29	N	b + 0 9 a − 21 9	37 0 68	+ 1 75	2 43	N	b − 0 2 a + 7 3	58 37 14	+ 1 49	38 63	36 20				
	3327	+ 23 59	N	s Q + 1 56	38 54 90	+ 1 68	56 58	N	s Q + 1 63	10 0 31 31	+ 1 53	32 84	36 26				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

MADRAS (E) *Lat* 13° 4′ *Long* 5h 21m 9s AND MANGALORE (W) *Lat* 12° 52′, *Long* 4h 59m 33s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan, with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Heaviside, with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl. Equations $S_E - H_W = -0^s 043$, $S_S - H_S = -0\ 018$	$\Delta L - \rho$
1888					h m s	s	s			h m s	s	s	m s				
Mar 7	3271	− 5 25	S	*I P W*	9 28 59 04	+1 42	60 46	S	*I P W*	9 50 35 16	+1 62	36 78	21 36 32	m s 21 36 293	− 0 016	− 0 018	21 36 259
	3303	− 0 38	S	d c − 0 1	34 9 78	+1 46	11 24	S	d c − 2 8	55 45 96	+1 60	47 56	36 32				
	3312	+ 10 24	S	b + 0 9, *a* −21 9	35 11 87	+1 56	13 43	S	b − 0 2, *a* + 7 3	56 48 13	+1 57	49 70	36 27				
	3339	+ 2 18	S	s Q + 1 56	40 38 47	+1 49	39 96	S	s Q + 1 63	10 2 14 63	+1 59	16 22	36 26				
	3409	+ 30 11	N	s Q − 1 56	9 53 13 08	−1 37	11 71	N	s Q −1 63	10 14 49 80	−1 77	48 03	21 36 32	m s 21 36 290	− 0 016	− 0 043	21 36 231
	3416	+ 32 29	N		54 37 71	−1 34	36 37	N		16 14 43	−1 77	12 66	36 29				
	3423	+ 22 29	N		56 38 89	−1 45	37 44	N		18 15 38	−1 73	13 65	36 21				
	3475	+ 13 55	N		10 5 41 42	−1 53	39 89	N		27 17 93	−1 70	16 23	36 34				
	3438	+ 5 33	S		9 58 61 53	−1 60	59 93	S		10 20 37 84	−1 68	36 16	21 36 23	m s 21 36 288	− 0 016	− 0 018	21 36 254
	3449	+ 6 10	S		10 0 60 83	−1 60	59 23	S		22 37 13	−1 68	35 45	36 22				
	3458	+ 0 11	S		2 17 13	−1 65	15 48	S		23 53 50	−1 66	51 84	36 36				
	3470	− 7 51	S		4 38 68	−1 72	36 96	S		26 14 94	−1 64	13 30	36 34				
Mar 8	3423	+ 22 29	N	*I P W*	9 56 40 06	−1 40	38 66	N	*I P E*	10 18 16 44	−1 63	14 81	21 36 15	m s 21 36 195	− 0 018	− 0 043	21 36 134
	3475	+ 13 55	N	d c + 1 9, b + 1 2, *a* −22 1, s Q − 1 57	10 5 42 67	−1 48	41 19	N	d c + 1 0, b + 0 5, *a* +10 4, s Q − 1 63	27 19 02	−1 59	17 43	36 24				
	3438	+ 5 33	S		9 59 2 69	−1 56	1 13	S		10 20 38 98	−1 57	37 41	21 36 28	m s 21 36 230	− 0 018	− 0 018	21 36 194
	3449	+ 6 10	S		10 1 2 03	−1 55	0 48	S		22 38 23	−1 57	36 66	36 18				
	3458	+ 0 11	S		2 18 43	−1 61	16 82	S		23 54 57	−1 55	53 02	36 20				
	3470	− 7 51	S		4 39 93	−1 67	38 26	S		26 16 04	−1 52	14 52	36 26				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

MADRAS (E) *Lat 13° 4 Long 5h 21m 9s*; AND MANGALORE (W) *Lat 12° 52′, Long 4h 59m 33s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan, with Telescope No 2: Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W, By Heavinde with Telescope No 1: Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Difference (W − E): Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $S_N - H_N = -0.043$, $S_S - H_S = -0.018$	$\Delta L - \rho$
1888		° ′			h m s	s	s			h m s	s	s	m s				
Mar 9	3278	+ 16 57	N	*I P E*	9 30 55 89	+1 63	57 52	N	*I P E*	9 52 31 80	+1 59	33 39	21 35 87	m s 21 35 895	− 0 015	− 0 043	21 35 837
	3292	+ 20 48	N	d c + 0 3	32 41 63	+1 66	43 29	N	d c + 1 0	54 17 59	+1 58	19 17	35 88				
	3317	+ 30 29	N	b + 0 7 a − 22 8	37 3 23	+1 76	4 99	N	b − 2 0 a + 6 9	58 39 34	+1 55	40 89	35 90				
	3327	+ 23 59	N	s Q + 1 56	38 57 48	+1 70	59 18	N	s Q + 1 63	10 0 33 55	+1 56	35 11	35 93				
	3303	− 0 38	S		9 34 12 58	+1 47	14 05	S		9 55 48 17	+1 65	49 82	21 35 77	m s 21 35 847	− 0 015	− 0 018	21 35 814
	3312	+ 10 24	S		35 14 59	+1 54	16 13	S		56 50 38	+1 62	52 00	35 87				
	3339	+ 2 18	S		40 41 16	+1 47	42 63	S		10 2 16 90	+1 63	18 53	35 90				
	3409	+ 30 11	N	s Q − 1 56	9 53 15 68	−1 37	14 31	N	s Q − 1 63	10 14 52 02	−1 72	50 30	21 35 99	m s 21 35 993	− 0 015	− 0 043	21 35 935
	3416	+ 32 29	N		54 40 27	−1 34	38 93	N		16 16 66	−1 72	14 94	36 01				
	3423	+ 22 29	N		56 41 47	−1 44	40 03	N		18 17 65	−1 68	15 97	35 94				
	3475	+ 13 55	N		10 5 44 05	−1 52	42 53	N		27 20 21	−1 65	18 56	36 03				
	3438	+ 5 33	S		9 59 4 14	−1 62	2 52	S		10 20 40 09	−1 63	38 46	21 35 94	m s 21 36 010	− 0 015	− 0 018	21 35 977
	3449	+ 6 10	S		10 1 3 37	−1 61	1 76	S		22 39 42	−1 63	37 79	36 03				
	3458	+ 0 11	S		2 19 77	−1 64	18 13	S		23 55 75	−1 61	54 14	36 01				
	3470	− 7 51	S		4 41 27	−1 76	39 51	S		26 17 1[illegible]	−1 60	15 57	36 06				
Mar 10	3278	+ 16 57	N	*I P E*	9 30 56 43	+1 74	58 17	N	*I P W*	9 52 32 54	+1 71	34 25	21 36 08	m s 21 36 075	− 0 009	− 0 043	21 36 023
	3292	+ 20 48	N	d c + 1 3	32 42 17	+1 79	43 96	N	d c + 2 2	54 18 32	+1 [illegible]2	20 04	36 08				
	3317	+ 30 29	N	b + 3 7 a − 29 9	37 3 [illegible]2	+1 93	5 65	N	b + 1 0 a − 1 3	58 40 03	+1 72	41 75	36 10				
	3327	+ 23 59	N	s Q + 1 58	38 58 07	+1 84	59 91	N	s Q + 1 64	10 0 34 22	+1 73	35 95	36 04				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

MADRAS (E) *Lat 13° 4, Long 5h 21m 9s* AND MANGALORE (W) *Lat 12° 52′ Long 4h 59m 33s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Heavinde, with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Peral Equations $S_N - H_N = -0.043$, $S_S - H_S = -0.018$	$\Delta L - \rho$
1888					h m s	s	s			h m s	s	s	m s				
Mar 10	3271	− 5 25	S	*I P E*	9 29 2 34	+1 48	3 82	S	*I P W*	9 50 38 16	+1 70	39 86	21 36 04	m s 21 36 043	− 0 009	− 0 018	21 36 016
	3303	− 0 38	S	d c + 1 3	34 13 13	+1 53	14 66	S	d c + 2 2	55 48 98	+1 71	50 69	36 03				
	3312	+ 10 24	S	b + 3 7 *a* −29 9	35 15 13	+1 66	16 79	S	b + 1 0 *a* − 1 3	56 51 09	+1 71	52 80	36 01				
	3339	+ 2 18	S	s Q + 1 58	40 41 67	+1 56	43 23	S	s Q + 1 64	10 2 17 62	+1 70	19 32	36 09				
	3409	+ 30 11	N	s Q − 1 58	9 53 16 25	−1 24	15 01	N	s Q − 1 64	10 14 52 68	−1 56	51 12	21 36 11	m s 21 36 075	− 0 009	− 0 043	21 36 023
	3416	+ 32 29	N		54 40 86	−1 20	39 66	N		16 17 31	−1 56	15 75	36 09				
	3423	+ 22 29	N		56 42 06	−1 35	40 71	N		18 18 29	−1 56	16 73	36 02				
	3475	+ 13 55	N		10 5 44 70	−1 46	43 24	N		27 20 88	−1 56	19 32	36 08				
	3438	+ 5 33	S		9 59 4 71	−1 56	3 15	S		10 20 40 79	−1 57	39 22	21 36 07	m s 21 36 068	− 0 009	− 0 018	21 36 041
	3449	+ 6 10	S		10 1 4 02	−1 55	2 47	S		22 40 13	−1 58	38 55	36 08				
	3458	+ 0 11	S		2 20 48	−1 62	18 86	S		23 56 48	−1 57	54 91	36 05				
	3470	− 7 51	S		4 41 98	−1 71	40 27	S		26 17 92	−1 58	16 34	36 07				
Mar 12	3278	+ 16 57	N	*I P W*	9 30 57 52	+1 59	59 11	N	*I P W*	9 52 33 67	+1 73	35 40	21 36 29	m s 21 36 265	− 0 008	− 0 043	21 36 214
	3292	+ 20 48	N	d c − 0 1	32 43 35	+1 63	s 44 98	N	d c + 2 2	54 19 46	+1 74	21 20	36 22				
	3317	+ 30 29	N	b − 1 3 *a* −28 8	37 4 91	+1 76	6 67	N	b + 1 3 *a* − 8 7	58 41 16	+1 77	42 93	36 26				
	3327	+ 23 59	N	s Q + 1 57	38 59 18	+1 67	60 85	N	s Q + 1 63	10 0 35 39	+1 75	37 14	36 29				
	3271	− 5 25	S		9 29 3 43	+1 33	4 76	S		9 50 39 33	+1 65	40 98	21 36 22	m s 21 36 228	− 0 008	− 0 018	21 36 202
	3303	− 0 38	S		34 14 13	+1 39	15 52	S		55 50 11	+1 66	51 77	36 25				
	3312	+ 10 24	S		35 16 19	+1 51	17 70	S		56 52 25	+1 70	53 95	36 25				
	3339	+ 2 18	S		40 42 87	+1 42	44 29	S		10 2 18 81	+1 67	20 48	36 19				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$.

MADRAS (E) *Lat 13° 4 Long 5h 21m 9* ; AND MANGALORE (W) *Lat 12° 52′, Long 4h 59m 33s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $S_N - H_N = -0^s.043$, $S_S - H_S = -0.018$	$\Delta L + \rho$
1888		°			h m s	s	s			h m s	s	s	m s				
Mar 5	3704	+ 30 0	N	*I P E*	10 21 32 47	+ 2 29	34 76	N	*I P W*	10 43 9 26	+ 1 52	10 78	21 36 02	m s 21 36 028	+ 0 009	− 0 043	21 35 994
	3710	+ 28 34	N	d c + 1 3	22 30 36	+ 2 22	32 58	N	d c − 2 8	44 7 16	+ 1 52	8 68	36 10				
	3735	+ 26 5	N	b + 0 5 a − 90 6	27 23 30	+ 2 11	25 41	N	b − 0 2 a + 4 2	48 59 84	+ 1 52	61 36	35 95				
	3742	+ 25 21	N	s Q + 1 57	28 19 01	+ 2 09	21 10	N	s Q + 1 63	49 55 61	+ 1 53	57 14	36 04				
	3663	− 1 9	S		10 14 29 41	+ 1 12	30 53	S		10 36 5 01	+ 1 60	6 61	21 36 08	m s 21 36 088	+ 0 009	− 0 018	21 36 079
	3672	+ 5 20	S		16 18 83	+ 1 34	20 17	S		37 54 68	+ 1 58	56 26	36 09				
	3720	+ 4 11	S		23 56 54	+ 1 29	57 83	S		45 32 37	+ 1 58	33 95	36 12				
	3726	+ 1 37	S		25 15 38	+ 1 21	16 59	S		46 51 06	+ 1 59	52 65	36 06				
	3797	+ 26 9	N	s Q − 1 57	10 39 52 82	− 1 03	51 79	N	s Q − 1 63	11 1 29 53	− 1 73	27 80	21 36 01	m s 21 36 018	+ 0 009	− 0 043	21 35 984
	3809	+ 25 16	N		41 37 81	− 1 05	36 76	N		3 14 42	− 1 74	12 68	35 92				
	3824	+ 15 0	N		44 40 90	− 1 46	39 44	N		6 17 22	− 1 70	15 52	36 08				
	3843	+ 13 55	N		48 49 97	− 1 50	48 47	N		10 26 23	− 1 70	24 53	36 06				
	3761	+ 12 18	S		10 32 39 62	− 1 56	38 06	S		10 54 15 83	− 1 69	14 14	21 36 08	m s 21 36 100	+ 0 009	− 0 018	21 36 091
	3832	+ 0 32	S		46 51 69	− 1 97	49 72	S		11 8 27 51	− 1 67	25 84	36 12				
Mar 7	3704	+ 30 0	N	*I P W*	10 21 31 57	+ 1 75	33 32	N	*I P W*	10 43 8 26	+ 1 50	9 76	21 36 44	m s 21 36 390	+ 0 009	− 0 043	21 36 356
	3710	+ 28 34	N	d c − 0 1	22 29 40	+ 1 73	31 13	N	d c − 2 8	44 6 03	+ 1 51	7 54	36 41				
	3742	+ 25 21	N	b + 0 9 a − 21 9	28 18 00	+ 1 70	19 70	N	b − 0 2 a + 7 3	49 54 50	+ 1 52	56 02	36 32				
				s Q + 1 56					s Q + 1 63								
	3663	− 1 9	S		10 14 27 81	+ 1 46	29 27	S		10 36 3 94	+ 1 60	5 54	21 36 27	m s 21 36 303	+ 0 009	− 0 018	21 36 294
	3672	+ 5 20	S		16 17 39	+ 1 51	18 90	S		37 53 69	+ 1 58	55 27	36 37				
	3726	+ 1 37	S		25 13 88	+ 1 48	15 36	S		46 50 04	+ 1 59	51 63	36 27				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MADRAS (E) *Lat 13° 4, Long 5h 21m 9* AND MANGALORE (W) *Lat 12° 52′ Long 4h 59m 33s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $S_N - H_N = -0^s\ 043$, $S_S - H_S = -0\ 018$	$\Delta L + \rho$
1888					h m s	s	s			h m s	s	s	m s				
Mar 7	3761	+ 12 18	S	*I P W* d c − 0 1 b + 0 9 a − 21 9 s Q − 1 56	10 32 38 40	− 1 55	36 85	S	*I P W* d c − 2 8 b − 0 2 a + 7 3 s Q − 1 63	10 54 14 ,6	− 1 71	13 05	21 36 20	m s 21 36 200	+ 0 009	− 0 018	21 36 191
Mar 8	3704	+ 30 0	N	*I P W* d c + 1 9 b + 1 2 a − 22 1 s Q + 1 57	10 21 30 91	+ 1 81	32 72	N	*I P E* d c + 1 0 b + 0 5 a + 10 4 s Q + 1 63	10 43 7 47	+ 1 60	9 07	21 36 35	m s 21 36 260	+ 0 009	− 0 043	21 36 226
	3710	+ 28 34	N		22 28 80	+ 1 80	30 60	N		44 5 24	+ 1 61	6 85	36 25				
	3735	+ 26 5	N		27 21 61	+ 1 78	23 39	N		48 58 03	+ 1 60	59 63	36 24				
	3742	+ 25 21	N		28 17 41	+ 1 77	19 18	N		49 53 78	+ 1 60	55 38	36 20				
	3672	+ 5 20	S		10 16 16 70	+ 1 58	18 28	S		10 37 52 94	+ 1 69	54 63	21 36 35	m s 21 36 295	+ 0 009	− 0 018	21 36 286
	3720	+ 4 11	S		23 54 46	+ 1 57	56 03	S		45 30 57	+ 1 70	32 27	36 24				
	3797	+ 26 9	N	s Q − 1 57	10 39 51 22	− 1 37	49 85	N	s Q − 1 63	11 1 27 81	− 1 64	26 17	21 36 32	m s 21 6 290	+ 0 009	− 0 043	21 36 256
	3809	+ 25 16	N		41 36 19	− 1 37	34 82	N		3 12 68	− 1 64	11 04	36 22				
	3824	+ 15 0	N		44 39 00	− 1 4,	37 53	N		6 15 48	− 1 61	13 87	36 34				
	3843	+ 13 55	N		48 48 12	− 1 48	46 64	N		10 24 52	− 1 60	22 92	36 28				
	3761	+ 12 18	S		10 32 37 70	− 1 50	36 20	S		10 54 14 10	− 1 60	12 50	21 36 30	m s 21 36 298	+ 0 009	− 0 018	21 36 289
	3785	+ 4 14	S		36 60 29	− 1 57	58 72	S		58 36 51	− 1 56	34 95	36 23				
	3788	+ 7 56	S		38 2 16	− 1 54	0 62	S		59 38 48	− 1 58	36 90	36 28				
	3832	+ 0 32	S		46 49 44	− 1 60	47 84	S		11 8 25 77	− 1 55	24 22	36 38				
Mar 9	3704	+ 30 0	N	*I P E* d c + 0 3 b + 0 7 a − 22 8 s Q + 1 56	10 21 30 57	+ 1 76	32 33	N	*I P E* d c + 1 0 b − 2 0 a + 6 9 s Q + 1 63	10 43 6 87	+ 1 56	8 43	21 36 10	m s 21 36 070	+ 0 013	− 0 043	21 36 040
	3710	+ 28 34	N		22 28 36	+ 1 75	30 11	N		44 4 65	+ 1 56	6 21	36 10				
	3735	+ 26 5	N		27 21 26	+ 1 ,1	22 97	N		48 57 46	+ 1 57	59 03	36 06				
	3742	+ 25 21	N		28 17 02	+ 1 70	18 72	N		49 53 17	+ 1 57	54 74	36 02				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MADRAS (E) *Lat* 13° 4, *Long* 5ʰ 21ᵐ 9ˢ AND MANGALORE (W) *Lat* 12° 52′ *Long* 4ʰ 59ᵐ 33ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Heavinde with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $S_N - H_N = -0^s\,043$, $S_S - H_S = -0\,018$	$\Delta L + \rho$
1888					h m s	s	s			h m s	s	s	m s				
Mar 9	3663	− 1 9	S	I P E	10 14 26 73	+ 1 45	28 18	S	I P E	10 36 2 54	+ 1 64	4 18	21 36 00				
	3672	+ 5 20	S	d c + 0 3	16 16 36	+ 1 51	17 87	S	d c + 1 0	37 52 26	+ 1 63	53 89	36 02	m s 21 36 053	+ 0 013	− 0 018	21 36 048
	3720	+ 4 11	S	b + 0 7 a − 22 8	23 53 98	+ 1 50	55 48	S	b − 2 0 a + 6 9	45 29 94	+ 1 64	31 58	36 10				
	3726	+ 1 37	S	s Q + 1 56	25 12 75	+ 1 48	14 23	S	s Q + 1 63	46 48 68	+ 1 64	50 32	36 09				
	3797	+ 26 9	N	s Q − 1 56	10 39 50 72	− 1 41	49 31	N	s Q − 1 63	11 1 27 17	− 1 69	25 48	21 36 17				
	3809	+ 25 16	N		41 35 66	− 1 42	34 24	N		3 12 04	− 1 68	10 36	36 12	m s 21 36 130	+ 0 013	− 0 043	21 36 100
	3824	+ 15 0	N		44 38 57	− 1 52	37 05	N		6 14 83	− 1 66	13 17	36 12				
	3843	+ 13 55	N		48 47 62	− 1 53	46 09	N		10 23 85	− 1 65	22 20	36 11				
	3761	+ 12 18	S		10 32 37 31	− 1 55	35 76	S		10 54 13 4,	− 1 66	11 81	21 36 05				
	3785	+ 4 14	S		36 59 89	− 1 62	58 27	S		58 35 82	− 1 62	34 20	35 93	m s 21 36 010	+ 0 013	− 0 018	21 36 005
	3788	+ 7 56	S		38 1 82	− 1 59	0 23	S		59 37 85	− 1 64	36 21	35 98				
	3832	+ 0 32	S		46 48 99	− 1 65	47 34	S		11 8 25 04	− 1 62	23 42	36 08				
Mar 10	3704	+ 30 0	N	I P E	10 21 29 30	+ 1 91	31 21	N	I P W	10 43 5 61	+ 1 73	7 34	21 36 13				
	3710	+ 28 34	N	d c + 1 3	22 27 09	+ 1 90	28 99	N	d c + 2 2	44 3 44	+ 1 73	5 17	36 18	m s 21 36 128	+ 0 018	− 0 043	21 36 103
	3735	+ 26 5	N	b + 3 7 a − 29 9	27 20 02	+ 1 8,	21 89	N	b + 1 0 a − 1 3	48 56 23	+ 1 73	57 96	36 07				
	3742	+ 25 21	N	s Q + 1 58	28 15 68	+ 1 86	17 54	N	s Q + 1 64	49 51 95	+ 1 72	53 67	36 13				
	3663	− 1 9	S		10 14 25 57	+ 1 52	27 09	S		10 36 1 44	+ 1 70	3 14	21 36 05				
	3672	+ 5 20	S		16 15 16	+ 1 60	16 76	S		37 51 18	+ 1 70	52 88	36 12	m s 21 36 105	+ 0 018	− 0 018	21 36 105
	3720	+ 4 11	S		23 52 82	+ 1 58	14 40	S		45 28 84	+ 1 71	30 55	36 15				
	3726	+ 1 37	S		25 11 58	+ 1 55	13 13	S		46 47 53	+ 1 70	49 23	36 10				
	3797	+ 26 9	N	s Q − 1 58	10 39 49 55	− 1 30	48 25	N	s Q − 1 64	11 1 25 99	− 1 56	24 43	21 36 18				
	3809	+ 25 16	N		41 34 43	− 1 30	33 13	N		3 10 92	− 1 56	9 36	36 23	m s 21 36 200	+ 0 018	− 0 043	21 36 175
	3824	+ 15 0	N		44 37 39	− 1 44	35 95	N		6 13 72	− 1 56	12 16	36 21				
	3843	+ 13 55	N		48 46 41	− 1 45	44 96	N		10 22 70	− 1 56	21 14	36 18				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MADRAS (E) *Lat* 13 4 *Long* 5ʰ 21ᵐ 9 AND MANGALORE (W) *Lat* 12° 52, *Long* 4ʰ 59ᵐ 33																	
Astronomical Date	Star		Transits Observed at E — *By Strahan with Telescope No 2*					Transits Observed at W — *By Heavinde with Telescope No 1*					Difference of Corrected Times (W − E)		Correction for Rate of W Clock	Corrns for Persl Equations $S_E - H_W = -0.043$, $S_E - H_S = -0.018$	$\Delta L + \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1888					h m s	s	s			h m s	s	s	m s				
Mar 10	3761	+ 12 18	S	*I P E*	10 32 36 11	−1 48	34 63	S	*I P W*	10 54 12 33	−1 57	10 ,6	21 36 13				
	3785	+ 4 14	S	d c + 1 3	36 58 63	−1 58	57 05	S	d c + 2 2	58 34 75	−1 58	33 17	36 12	m s 21 36 128	+ 0 018	− 0 018	21 36 128
	3788	+ 7 56	S	b + 3 7 a −29 9	37 60 59	−1 53	59 06	S	b + 1 0 a − 1 3	59 36 76	−1 57	35 19	36 13				
	3832	+ 0 32	S	s Q − 1 58	46 47 91	−1 61	46 ,30	S	s Q − 1 64	11 8 24 00	−1 57	22 43	36 13				
Mar 12	3704	+ 30 0	N	*I P W*	10 21 26 81	+1 76	28 57	N	*I P W*	10 43 3 10	+1 86	4 96	21 36 39				
	3710	+ 28 34	N	d c − 0 1	22 24 57	+1 74	26 31	N	d c + 2 2	44 0 92	+1 86	2 78	36 47	m s 21 36 4,0	+ 0 019	− 0 043	21 36 426
	3735	+ 26 5	N	b − 1 3 a 28 8	27 17 43	+1 70	19 13	N	b + 1 3 a − 8 7	48 53 72	+1 85	55 57	36 44				
	3742	+ 2,21	N	s Q + 1 57	28 13 15	+1 69	14 84	N	s Q + 1 72	49 49 49	+1 85	51 34	36 50				
	3663	− 1 9	S		10 14 23 03	+1 38	24 41	S		10 35 59 00	+1 76	60 ,6	21 36 35				
	3672	+ 5 20	S		16 12 60	+1 45	14 05	S		37 48 68	+1 ,7	50 45	36 40	m s 21 36 340	+ 0 019	− 0 018	21 36 341
	3720	+ 4 11	S		23 50 38	+1 44	51 82	S		45 26 32	+1 77	28 09	36 27				
	3797	+ 26 9	N	s Q − 1 57	10 39 47 03	−1 44	45 59	N	s Q − 1 72	11 1 23 59	−1 59	22 00	21 36 41				
	3809	+ 25 16	N		41 31 92	−1 45	30 47	N		3 8 49	−1 60	6 89	36 42	m s 21 36 423	+ 0 019	− 0 043	21 36 399
	3824	+ 15 0	N		44 34 84	−1 58	33 26	N		6 11 33	−1 63	9 70	36 44				
	3761	+ 12 18	S		10 32 33 50	−1 61	31 89	S		10 54 9 93	−1 64	8 29	21 36 40				
	3785	+ 4 14	S		36 56 03	−1 70	54 33	S		58 32 45	−1 67	30 78	36 45	m s 21 36 437	+ 0 019	− 0 018	21 36 438
	3788	+ 7 56	S		37 58 00	−1 66	56 34	S		59 34 46	−1 66	32 80	36 46				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

BELLARY (F) *Lat* 15° 9′ *Long* 5ʰ 7ᵐ 52ˢ; AND MANGALORE (W) *Lat* 12° 52′ *Long* 4ʰ 59ᵐ 38ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $S_W - H_N = -0.043$, $S_S - H_S = -0.018$	$\Delta L - \rho$
1888					h m s	s	s			h m s	s	s	m s				
Mar 21	3704	+ 30 0	N	*I P E*	10 42 44 99	+1 86	46 85	N	*I P E*	10 51 4 61	+1 79	6 40	8 19 55	m s 8 19 558	+ 0 020	− 0 043	8 19 555
	3710	+ 28 34	N	d c + 1 2	43 42 79	+1 84	44 63	N	d c + 1 0	52 2 43	+1 79	4 22	19 59				
	3735	+ 26 5	N	b + 2 8 a −23 8	48 35 67	+1 81	37 48	N	b − 0 8 a − 7 0	56 55 25	+1 78	57 03	19 55				
	3742	+ 25 21	N	s Q + 1 60	49 31 38	+1 81	33 19	N	s Q + 1 73	57 51 04	+1 77	52 81	19 62				
	3663	− 1 9	S		10 35 41 14	+1 55	42 69	S		10 44 0 43	+1 69	2 12	8 19 43	m s 8 19 465	+ 0 020	− 0 018	8 19 467
	3672	+ 5 20	S		37 30 79	+1 61	32 40	S		45 50 17	+1 71	51 88	19 48				
	3720	+ 4 11	S		45 8 54	+1 60	10 14	S		53 27 88	+1 71	29 59	19 45				
	3726	+ 1 37	S		46 27 21	+1 56	28 77	S		54 46 57	+1 70	48 27	19 50				
	3797	+ 26 9	N	s Q − 1 60	11 1 5 36	−1 38	3 98	N	s Q − 1 73	11 9 25 18	−1 68	23 50	8 19 52	m s 8 19 54	+ 0 020	− 0 043	8 19 524
	3809	+ 25 16	N		2 50 21	−1 40	48 81	N		11 10 07	−1 68	8 39	19 58				
	3824	+ 15 0	N		5 53 14	−1 50	51 64	N		14 12 90	−1 72	11 18	19 54				
	3761	+ 12 18	S		10 53 51 84	−1 53	50 31	S		11 2 11 53	−1 73	9 80	8 19 49	m s 8 19 498	+ 0 020	− 0 018	8 19 500
	3785	+ 4 14	S		58 14 30	−1 60	12 70	S		6 33 95	−1 75	32 20	19 50				
	3788	+ 7 56	S		59 16 25	−1 57	14 68	S		7 35 91	−1 74	34 17	19 49				
	3832	+ 0 32	S		11 8 3 60	−1 65	1 95	S		16 23 22	−1 76	21 46	19 51				
Mar 22	3704	+ 30 0	N	*I P E*	10 42 41 63	+1 81	43 44	N	*I P E*	10 51 1 16	+1 82	2 98	8 19 54	m s 8 19 553	+ 0 021	− 0 043	8 19 531
	3710	+ 28 34	N	d c + 1 2	43 39 42	+1 79	41 21	N	d c + 1 0	51 58 99	+1 81	60 80	19 59				
	3735	+ 26 5	N	b + 0 8 a −23 7	48 32 32	+1 76	34 08	N	b − 0 8 a − 8 9	56 51 82	+1 80	53 62	19 54				
	3742	+ 25 21	N	s Q + 1 60	49 28 05	+1 76	29 81	N	s Q + 1 74	57 47 55	+1 80	49 35	19 54				
	3663	− 1 9	S		10 35 37 75	+1 50	39 25	S		10 43 57 15	+1 69	58 84	8 19 59	m s 8 19 565	+ 0 021	− 0 018	8 19 568
	3672	+ 5 20	S		37 27 41	+1 56	28 97	S		45 46 86	+1 71	48 57	19 60				
	3720	+ 4 11	S		45 5 05	+1 55	6 60	S		53 24 43	+1 71	26 14	19 54				
	3726	+ 1 37	S		46 23 80	+1 52	25 32	S		54 43 15	+1 70	44 85	19 53				

BELLARY (E) *Lat* 15° 9′ *Long* 5ʰ 7ᵐ 52ˢ AND MANGALORE (W) *Lat* 12° 52′, *Long* 4ʰ 59ᵐ 33ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $S_N - H_N = -0\ 043$, $S_S - H_S = -0\ 018$	$\Delta L - \rho$
1888					h m s	s	s			h m s	s	s	m s				
Mar 22	3797	+ 26 9	N	*I P E*	11 1 1 89	−1 43	0 46	N	*I P E*	11 9 21 72	−1 68	20 04	8 19 58	m s 8 19 580	+ 0 021	− 0 043	8 19 558
	3809	+ 25 16	N	d c + 1 2	2 46 82	−1 45	45 37	N	d c + 1 0	11 6 65	−1 68	4 97	19 60				
	3824	+ 15 0	N	b + 0 8 a −23 7	5 49 72	−1 55	48 17	N	b − 0 8 a − 8 9	14 9 46	−1 73	7 73	19 56				
				s Q − 1 60					s Q − 1 74								
	3761	+ 12 18	S		10 53 48 36	−1 58	46 78	S		11 2 8 09	−1 74	6 35	8 19 57	m s 8 19 578	+ 0 021	− 0 018	8 19 581
	3785	+ 4 14	S		58 10 84	−1 65	9 19	S		6 30 54	−1 76	28 78	19 59				
	3788	+ 7 56	S		59 12 85	−1 62	11 23	S		7 32 57	−1 76	30 81	19 58				
	3832	+ 0 32	S		11 7 60 14	−1 68	58 46	S		16 19 81	−1 78	18 03	19 57				
Mar 23	3704	+ 30 0	N	*I P E*	10 42 37 67	+1 95	39 62	N	*I P E*	10 50 57 32	+1 81	59 13	8 19 51	m s 8 19 468	+ 0 023	− 0 043	8 19 448
	3710	+ 28 34	N	d c + 1 2	43 35 45	+1 93	37 38	N	d c + 1 0	51 55 05	+1 81	56 86	19 48				
	3735	+ 26 5	N	b + 4 3 a −24 4	48 28 36	+1 90	30 26	N	b + 0 2 a − 7 0	56 47 89	+1 81	49 70	19 44				
	3742	+ 25 21	N	s Q + 1 65	49 24 02	+1 89	25 91	N	s Q + 1 72	57 43 56	+1 79	45 35	19 44				
	3672	+ 5 20	S		10 37 23 42	+1 69	25 11	S		10 45 42 93	+1 72	44 65	8 19 54	m s 8 19 457	+ 0 023	− 0 018	8 19 462
	3720	+ 4 11	S		45 1 10	+1 68	2 78	S		53 20 49	+1 71	22 20	19 42				
	3726	+ 1 37	S		46 19 87	+1 65	21 52	S		54 39 22	+1 71	40 93	19 41				
	3797	+ 26 9	N	s Q − 1 65	11 0 58 08	−1 39	56 69	N	s Q − 1 72	11 9 17 81	−1 64	16 17	8 19 48	m s 8 19 500	+ 0 023	− 0 043	8 19 480
	3809	+ 25 16	N		2 42 97	−1 42	41 55	N		11 2 68	−1 64	1 04	19 49				
	3824	+ 15 0	N		5 45 85	−1 52	44 3	N		14 5 53	−1 67	3 86	19 53				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

BELLARY (E) *Lat* 15° 9′, *Long* 5ʰ 7ᵐ 52ˢ; AND MANGALORE (W) *Lat* 12° 52′, *Long* 4ʰ 59ᵐ 33ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heavinde with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $S_N - H_N = -0^s\ 043$, $S_S - H_S = -0\ 018$	$\Delta L - \rho$
1888					h m s	s	s			h m s	s	s	m s				
Mar 23	3761	+ 12 18	S	I P E	10 13 44 50	− 1 55	42 95	S	I P E	11 2 4 15	− 1 70	2 45	8 19 50	m s 8 19 490	+ 0 023	− 0 018	8 19 495
	3785	+ 4 14	S	d c + 1 2	58 7 02	− 1 62	5 40	S	d c + 1 0	6 26 61	− 1 73	24 88	19 48				
	3788	+ 7 56	S	b + 4 3 a − 24 4	59 9 03	− 1 59	7 44	S	b + 0 2 a − 7 0	7 28 64	− 1 72	26 92	19 48				
	3832	+ 0 32	S	s Q − 1 65	11 7 56 28	− 1 66	54 62	S	s Q − 1 72	16 15 85	− 1 73	14 12	19 50				
Mar 24	3663	− 1 9	S	I P W	10 35 29 95	+ 1 15	31 10	S	I P E	10 43 48 91	+ 1 74	50 65	8 19 55	m s 8 19 580	+ 0 024	− 0 018	8 19 586
	3672	+ 5 20	S	d c + 2 0	37 19 43	+ 1 35	20 78	S	d c + 1 0	45 38 63	+ 1 76	40 39	19 61				
				b − 0 3 a − 81 7					b + 0 8 a − 5 0								
				s Q + 1 62					s Q + 1 73								
Mar 26	3710	+ 28 34	N	I P W	10 43 21 96	+ 2 02	23 98	N	I P W	10 51 41 73	+ 1 86	43 59	8 19 61	m s 8 19 633	+ 0 027	− 0 043	8 19 61,
	3735	+ 26 5	N	d c 0 0	48 14 79	+ 1 95	16 74	N	d c + 2 2	56 34 57	+ 1 81	36 38	19 64				
	3742	+ 25 21	N	b − 0 5 a − 70 0	49 10 58	+ 1 93	12 51	N	b − 0 1 a − 7 9	57 30 33	+ 1 83	32 16	19 65				
				s Q + 1 63					s Q + 1 72								
	3720	+ 4 11	S		10 44 48 01	+ 1 32	49 33	S		10 53 7 17	+ 1 74	8 91	8 19 58	m s 8 19 610	+ 0 027	− 0 018	8 19 619
	3726	+ 1 37	S		46 6 78	+ 1 26	8 04	S		54 25 94	+ 1 74	27 68	19 64				
	3797	+ 26 9	N	s Q − 1 63	11 0 44 51	− 1 31	43 20	N	s Q − 1 72	11 9 4 48	− 1 62	2 86	8 19 66	m s 8 19 663	+ 0 027	− 0 043	8 19 647
	3809	+ 25 16	N		2 29 41	− 1 35	28 06	N		10 49 34	− 1 62	47 72	19 66				
	3824	+ 15 0	N		5 32 49	− 1 64	30 85	N		13 52 17	− 1 65	50 52	19 67				

Astronl Date	Stat on	I t ιer t l Po t on	C lln t oι C				L l M	b	Remarks	St t n	I t ι t l I t	Ϲ ll t o (	(			I l M	l	Remarks
			C	C	c	c	M	b				(	(			M	l	
1877			l	d	d	d	d	d				l	l	d	d	d	d	
Ap 25	BOMBAY (T l pe No 1)	IPE	8 8							ADEN (T l c p No 2)	IPE	(8						
26			8(3									5						
27												(8)						
28			84 2									o 4						
29			8 3	8 o	−o 5	−1 4	81 9	+2 (										
30			84 4	85 o	−o 5	− 4	8 6	+2)				(8 8	o o	− 4	− 3	(5 4	+4 2	
May 1		IIW	84	8	+o 5	−o 4	83 5	−			IPW	7	o	+ 4	−	(	− 3	
2			83 7	85 o	+o 5	−o 4	82)	−1 4				(9)		+o 4	−o 5	( ))	+o 3	
							83 3		M an C									M n C
3			81 7	85	+o 5	−o 4	8 3	−1 o	d IPE = 84 7			o	o	+o 4	−o 5	o 1	+ 5	l IPE = ( )
							83 8		IIW = 84 3									IPW = 70 1
4			82 9	85	+ 5	−o 4	84 5	−o	G l M = 84 5			(9	o o	+o 4	−o 5	o (	+1	G l M ( ) (
							84											
5		IPE	83 7	8	−o 5	− 4	84)	−o 4					o	+o 4	− 5	(	+3 o	
6												( ) (	o o	+ 4	− 5	3 2	+3 (	
7			8)	85	−o 5	−1 4	8 3	−o 9			IPE	(8 (	o o	−o 4	−1 3	(2 3	+ 3	
							8 4											
8		IPW	86 4	85 o	+o 5	−o 4	88	+3 6				(8 8	o o	− 4	−1 3	o 2	− (	
							88											
9			84	85	+ 5	−o 4	85 4	+				(8		−o 4	3	( )	o (	
							86											
M y 3	ADEN (T l cope No 1)									SUEZ (T l)	III	4						
2		IIE	41 1	4 o	+1	+o 6	34 3	+ 4				2	o	+)	+1	o1	−24 8	
							34 o											
26			41 5	40	+ 5	+o 6	44 o	−2				3 3	5 o	+)	+1	77 6	− o	
							43 o		Mean C									Mean C
27			42 1	40 o	+1 5	+o 6	4 1	−o 6	d IPE = 41 6			4 2	5 o	+1)	+1 1	75)	+ o	d IPE = 74 3
							42		IPW = 4 4									IIW −) 5
28		IPW	42 5	40 o	−1 5	−2 4	41 o	+o 1	Ge r l Me n = 4 5		IPW	8	5 o	−1 9	−2 7	4 2	− 2	G l M an = (9
							42 2											
29			40 (	4 o	−1 5	−2 4	39 4	−2 2				9 3	75 o	−1 9	−2 7	75)	−1 o	
							39 2											
30			41 1	40 o	−1 5	−2 4	3) 8	−1 7				80 o	75	−1 9	−2 7	74 o	−2 9	
							9 8					80 o	75 o					

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

BELLARY (E) *Lat* 15° 9 *Long* 5h 7m 59s ; AND MANGALORE (W) *Lat* 12° 52′, *Long* 4h 59m 38s

Astronomical Date	Star		Transits Observed at E — *By Strahan, with Telescope No 2*					Transits Observed at W — *By Heavinde, with Telescope No 1*					Difference of Corrected Times (W − E)		Correction for Rate of W Clock	Corrns for Persl Equations $S_N - H_N = -0^s\ 043$; $S_S - H_S = -0\ 018$	$\Delta L + \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1838		°			h m s	s	s			h m s	s	s	m s				
Mar. 21	3932	+ 17 25	N	*I P E*	11 20 42 09	+1 72	43 81	N	*I P E*	11 29 1 73	+1 75	3 48	8 19 67	m s 8 19 685	+ 0 003	− 0 043	8 19 645
	3937	+ 28 24	N	d c + 1 2	21 13 54	+1 84	15 38	N	d c + 1 0	30 33 30	+1 78	35 08	19 70				
	3964	+ 21 59	N	b + 2 8 *a* − 23 8	26 46 98	+1 77	48 75	N	b − 0 8 *a* − 7 0	35 6 66	+1 77	8 43	19 68				
	3990	+ 20 51	N	s Q + 1 60	34 1 86	+1 70	3 56	N	s Q + 1 73	42 21 50	+1 75	23 25	19 69				
	3954	+ 8 45	S		11 24 30 60	+1 63	32 23	S		11 32 50 19	+1 72	51 91	8 19 68	m s 8 19 673	+ 0 00,	− 0 018	8 19 658
	3971	+ 5 22	S		28 13 21	+1 60	14 81	S		36 32 78	+1 71	34 49	19 68				
	3975	− 6 [illegible]	S		30 1 60	+1 50	3 10	S		38 21 07	+1 68	22 75	19 65				
	3979	+ 8 53	S		31 20 15	+1 64	21 79	S		39 39 75	+1 72	41 47	19 68				
	4014	+ 16 4	N	s Q − 1 60	11 38 52 54	−1 49	51 05	N	s Q − 1 73	11 47 12 42	−1 72	10 70	8 19 65	m s 8 19 680	+ 0 003	− 0 043	8 19 640
	4081	+ 16 16	N		41 47 57	−1 49	46 08	N		50 7 45	−1 72	5 73	19 65				
	4056	+ 22 43	N		47 52 63	−1 42	51 21	N		56 12 62	−1 69	10 93	19 72				
	4066	+ 22 5	N		50 25 03	−1 43	23 60	N		58 44 99	−1 69	43 30	19 70				
	4021	+ 5 30	S		11 40 12 64	−1 60	11 04	S		11 48 32 40	−1 75	30 65	8 19 61	m s 8 19 643	+ 0 003	− 0 018	8 19 628
	4089	+ 4 6	S		44 22 24	−1 61	20 63	S		52 42 05	−1 75	40 30	19 67				
	4049	+ 4 17	S		46 5 51	−1 61	3 90	S		54 25 28	−1 75	23 53	19 63				
	4072	+ 9 21	S		51 22 94	−1 56	21 38	S		59 42 78	−1 74	41 04	19 66				
Mar 22	3932	+ 17 25	N	*I P E*	11 20 41 46	+1 67	43 13	N	*I P E*	11 29 1 15	+1 77	2 92	8 19 79	m s 8 19 ,63	+ 0 003	− 0 043	8 19 723
	3937	+ 28 24	N	d c + 1 2	22 12 96	+1 79	14 75	N	d c + 1 0	30 32 69	+1 81	34 50	19 75				
	3964	+ 21 59	N	b + 0 8 *a* − 23 7	26 46 40	+1 72	48 12	N	b − 0 8 *a* − 8 9	35 6 04	+1 8	7 82	19 70				
	3990	+ 20 51	N	s Q + 1 60	34 1 25	+1 65	2 90	N	s Q + 1 74	42 20 93	+1 78	22 71	19 81				
	3[illegible]4	+ 8 45	S		11 24 29 98	+1 59	31 57	S		11 32 49 57	+1 73	51 30	8 19 73	m s 8 19 713	+ 0 003	− 0 018	8 19 698
	3971	+ 5 22	S		28 12 62	+1 56	14 18	S		36 32 15	+1 71	33 86	19 68				
	3[illegible]7[illegible]	− 6 3	S		30 1 02	+1 45	2 47	S		38 20 49	+1 67	22 16	19 69				
	3979	+ 8 53	S		31 19 55	+1 59	21 14	S		39 39 16	+1 73	40 89	19 75				

BELLARY (E) *Lat* 15° 9′ *Long* 5h 7m 52s ; AND MANGALORE (W) *Lat* 12° 52′, *Long* 4h 59m 88

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Heaviside, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $S_N - H_N = -0\ 043$, $S_S - H_S = -0\ 018$	$\Delta L + \rho$
1888					h m s	s	s			h m s	s	s	m s				
Mar 22	4014	+ 16 4	N	*I P E*	11 38 51 97	−1 54	50 43	N	*I P E*	11 47 11 79	−1 72	10 07	8 19 64	m s 8 19 668	+ 0 003	− 0 043	8 19 628
	4031	+ 16 16	N	d c + 1 2	41 47 00	−1 54	45 46	N	d c + 1 0	50 6 84	−1 72	5 12	19 66				
	4056	+ 22 43	N	b + 0 8 a − 23 7	47 52 08	−1 47	50 61	N	b − 0 8 a − 8 9	56 11 99	−1 69	10 30	19 69				
	4066	+ 22 5	N	s Q − 1 60	50 24 49	−1 48	23 01	N	s Q − 1 74	58 44 38	−1 69	42 69	19 68				
	4021	+ 5 30	S		11 40 12 08	−1 64	10 44	S		11 48 31 84	−1 77	30 07	8 19 63	m s 8 19 660	+ 0 003	− 0 018	8 19 645
	4039	+ 4 6	S		44 21 67	−1 65	20 02	S		52 41 50	−1 77	39 73	19 71				
	4049	+ 4 17	S		46 4 93	−1 65	3 28	S		54 24 72	−1 77	22 95	19 67				
	1072	+ 9 21	S		51 22 41	−1 61	20 80	S		59 42 18	−1 75	40 43	19 63				
Mar 23	3932	+ 17 25	N	*I P E*	11 20 40 87	+1 80	42 67	N	*I P E*	11 29 0 61	+1 77	2 38	8 19 71	m s 8 19 713	+ 0 003	− 0 043	8 19 673
	393-	+ 28 24	N	d c + 1 2	22 12 37	+1 92	14 29	N	d c + 1 0	30 32 15	+1 80	33 95	19 66				
	3964	+ 1 59	N	b + 4 3 a − 4 4	26 45 78	+1 85	47 63	N	b + 0 2 a − 7 0	35 5 55	+1 79	7 34	19 71				
	3990	+ 20 51	N	s Q + 1 65	34 0 63	+1 78	2 41	N	s Q + 1 72	42 20 40	+1 78	22 18	19 77				
	3954	+ 8 45	S		11 24 29 37	+1 71	31 08	S		11 32 49 03	+1 74	50 77	8 19 69	m s 8 19 668	+ 0 003	− 0 018	8 19 653
	3971	+ 5 22	S		28 12 01	+1 68	13 69	S		36 31 62	+1 72	33 34	19 65				
	3975	− 6 3	S		30 0 40	+1 57	1 97	S		38 19 98	+1 69	1 67	19 70				
	3979	+ 8 53	S		31 18 99	+1 71	20 70	S		39 38 60	+1 73	40 33	19 63				
	4014	+ 16 4	N	s Q − 1 65	11 38 51 38	−1 51	49 87	N	s Q − 1 72	11 47 11 23	−1 67	9 56	8 19 69	m s 8 19 733	+ 0 003	− 0 043	8 19 693
	4031	+ 16 16	N		41 46 39	−1 51	44 88	N		50 6 29	−1 67	4 62	19 74				
	4056	+ 22 43	N		47 51 50	−1 44	50 06	N		56 11 48	−1 66	9 82	19 76				
	4066	+ 22 5	N		50 23 88	−1 45	22 43	N		58 43 83	−1 66	42 17	19 74				
	4021	+ 5 30	S		11 40 11 52	−1 62	9 90	S		11 48 31 28	−1 72	29 56	8 19 66	m s 8 19 725	+ 0 003	− 0 018	8 19 710
	4039	+ 4 6	S		44 21 14	−1 63	19 51	S		52 41 05	−1 72	39 33	19 82				
	4049	+ 4 17	S		46 4 31	−1 63	2 68	S		54 24 10	−1 73	22 37	19 69				
	1072	+ 9 21	S		51 21 80	−1 59	20 21	S		59 41 65	−1 71	39 94	19 73				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

BELLARY (E) *Lat 15° 9′ Long 5h 7m 52s* **AND MANGALORE** (W) *Lat 12° 52′, Long 4h 59m 38s*

Astronomical Date	Star		Transits Observed at E — *By Strahan with Telescope No 2*					Transits Observed at W — *By Heaviside with Telescope No 1*					Difference of Corrected Times (W − E)		Correction for Rate of W Clock	Corrns for Persl Equations $S_W - H_N = -0^s\ 043$, $S_S - H_S = -0\ 018$	$\Delta L + \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
					h m s	s	s			h m s	s	s	m s	m s			
1888 Mar 24	3964	+ 21 59	N	*I P W* d c + 2 0 b − 0 3 *a* −81 7 s Q + 1 62	11 26 45 23	+ 1 90	47 13	N	*I P E* d c + 1 0 b + 0 8 *a* − 5 0 s Q + 1 73	11 35 5 02	+ 1 79	6 81	8 19 68	8 19 680	+ 0 003	− 0 043	8 19 640
	3979	+ 8 53	S		11 31 18 71	+ 1 47	20 18	S		11 39 38 15	+ 1 76	9 91	8 19 73	8 19 730	+ 0 003	− 0 018	8 19 715
	4014	+ 16 4	N	s Q − 1 62	11 38 51 04	− 1 55	49 49	N	s Q − 1 73	11 47 10 82	− 1 67	9 15	8 19 66	8 19 697	+ 0 003	− 0 043	8 19 657
	4056	+ 22 43	N		47 50 99	− 1 32	49 67	N		56 11 01	− 1 66	9 35	19 68				
	4066	+ 22 5	N		50 23 32	− 1 34	21 98	N		58 43 39	− 1 66	41 73	19 75				
	4021	+ 5 30	S		11 40 11 36	− 1 90	9 46	S		11 48 30 81	− 1 70	29 11	8 19 65	8 19 688	+ 0 003	− 0 018	8 19 673
	4039	+ 4 6	S		44 21 01	− 1 94	19 07	S		52 40 50	− 1 71	38 79	19 72				
	4049	+ 4 17	S		46 4 21	− 1 93	2 28	S		54 23 70	− 1 71	21 99	19 71				
	4072	+ 9 21	S		51 21 55	− 1 77	19 78	S		59 41 15	− 1 70	39 45	19 67				
Mar 25	3932	+ 17 25	N	*I P W* d c + 2 0 b − 0 1 *a* −53 5 s Q + 1 63	11 20 40 07	+ 1 73	41 80	N	*I P W* d c + 2 2 b + 0 1 *a* − 5 1 s Q + 1 72	11 28 59 74	+ 1 79	61 53	8 19 73	8 19 730	+ 0 002	− 0 043	8 19 689
	3937	+ 28 24	N		22 11 37	+ 1 98	13 35	N		30 31 28	+ 1 80	33 08	19 73				
	3954	+ 8 45	S		11 24 30 21	− 0 08*	30 13	S		11 32 48 11	+ 1 76	49 87	8 19 74	8 19 737	+ 0 002	− 0 018	8 19 721
	3971	+ 5 22	S		28 11 26	+ 1 47	12 73	S		36 30 72	+ 1 76	32 48	19 75				
	3975	− 6 3	S		29 59 83	+ 1 23	61 06	S		38 19 05	+ 1 73	20 ,8	19 72				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in this case Q = 0 00

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

BELLARY (E) *Lat* 15° 9 *Long* $5^h\ 7^m\ 52^s$ AND MANGALORE (W) *Lat* 12° 59 *Long* $4^h\ 59^m\ 33^s$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Heaviside with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $S_N - H_N = -0\ 043$, $S_S - H_S = -0\ 018$	$\Delta L + \rho$
1888					h m s	s	s			h m s	s	s	m s				
Mar 25	4056	+ 22 43	N	*I P W* d c + 2 0 b − 0 1 a −53 5 s Q − 1 63	11 47 48 92	+0 20*	49 12	N	*I P W* d c + 2 2 b + 0 1 a − 5 1 s Q − 1 72	11 56 10 56	−1 65	8 91	8 19 79	m s 8 19 770	+ 0 002	− 0 043	8 19 729
	4066	+ 22 5	N		50 21 35	+0 19*	21 54	N		58 42 93	−1 64	41 29	19 75				
	4039	+ 4 6	S		11 44 20 42	−1 82	18 60	S		11 52 40 04	−1 68	38 36	8 19 76	m s 8 19 737	+ 0 002	− 0 018	8 19 721
	4049	+ 4 17	S		46 3 59	−1 82	1 77	S		54 23 23	−1 69	21 54	19 77				
	4072	+ 9 21	S		51 21 04	−1 71	19 33	S		59 40 69	−1 68	39 01	19 68				
Mar 26	3932	+ 17 25	N	*I P W* d c 0 0 b − 0 5 a −70 0 s Q + 1 63	11 20 39 67	+1 68	41 35	N	*I P W* d c + 2 2 b − 0 1 a − 7 9 s Q + 1 72	11 28 59 41	+1 79	61 20	8 19 85	m s 8 19 860	0 000	− 0 043	8 19 817
	3937	+ 28 24	N		22 10 94	+2 02	12 96	N		30 30 99	+1 82	32 81	19 85				
	3964	+ 1 59	N		26 44 47	+1 82	46 29	N		35 4 26	+1 82	6 08	19 79				
	3990	+ 20 51	N		33 59 37	+1 62	60 99	N		42 19 14	+1 80	20 94	19 95				
	3954	+ 8 45	S		11 24 28 33	+1 44	29 77	S		11 32 47 78	+1 76	49 54	8 19 77	m s 8 19 780	0 000	− 0 018	8 19 762
	397	+ 5 22	S		28 11 03	+1 35	12 38	S		36 30 44	+1 74	32 18	19 80				
	3975	− 6 3	S		29 59 63	+1 05	60 68	S		38 18 73	+1 72	20 45	19 77				
	3979	+ 8 53	S		31 17 95	+1 44	19 39	S		39 37 41	+1 76	39 17	19 78				
	4014	+ 16 4	N	s Q − 1 63	11 38 50 21	−1 61	48 60	N	s Q − 1 72	11 47 10 10	−1 66	8 44	8 19 84	m s 8 19 825	0 000	− 0 043	8 19 782
	4031	+ 16 16	N		41 45 23	−1 61	43 62	N		50 5 08	−1 66	3 42	19 80				
	4056	+ 22 43	N		47 50 23	−1 43	48 80	N		56 10 26	−1 64	8 62	19 82				
	4066	+ 22 5	N		50 22 64	−1 45	21 19	N		58 42 66	−1 63	41 03	19 84				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off and consequently in these cases $Q = 0\ 00$

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + p$

BELLARY (E) *Lat* 15° 9′, *Long* 5ʰ 7ᵐ 52ˢ; AND MANGALORE (W) *Lat* 12° 52′ *Long* 4ʰ 59ᵐ 33ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Strahan with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Heaviside with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $S_N - H_N = -0.043$, $S_S - H_S = -0.018$	$\Delta L + p$
1888		°			h m s	s	s			h m s	s	s	m s				
Mar 26	4021	+ 5 30	S	*I P W* d c 0 0 b − 0 5 a − 70 0 s Q − 1 63	11 40 10 55	− 1 91	8 64	S	*I P W* d c + 2 2 b − 0 1 a − 7 9 s Q − 1 72	11 48 30 15	− 1 69	28 46	8 19 82	m s 8 19 775	0 000	− 0 018	8 19 757
	4039	+ 4 6	S		44 20 19	− 1 94	18 25	S		52 39 73	− 1 70	38 03	19 78				
	4049	+ 4 17	S		46 3 41	− 1 94	1 47	S		54 22 94	− 1 70	21 24	19 77				
	4072	+ 9 21	S		51 20 80	− 1 80	19 00	S		59 40 41	− 1 68	38 73	19 73				
Mar 27	3932	+ 17 25	N	*I P E* d c − 0 8 b − 5 4 a − 51 8 s Q + 1 64	11 20 40 19	+ 1 54	41 73	N	*I P W* d c + 2 2 b − 0 9 a − 4 7 s Q + 1 73	11 28 59 82	+ 1 78	61 60	8 19 87	m s 8 19 843	− 0 002	− 0 043	8 19 798
	3937	+ 28 24	N		22 11 56	+ 1 79	13 35	N		30 31 34	+ 1 79	33 13	19 78				
	3964	+ 21 59	N		26 45 07	+ 1 65	46 72	N		35 4 76	+ 1 78	6 54	19 82				
	3990	+ 20 51	N		33 59 90	+ 1 51	61 41	N		42 19 53	+ 1 78	21 31	19 90				
	3954	+ 8 45	S		11 24 28 80	+ 1 37	30 17	S		11 32 48 2	+ 1 75	49 97	8 19 80	m s 8 19 803	− 0 002	− 0 018	8 19 783
	3971	+ 5 22	S		28 11 43	+ 1 30	12 73	S		36 30 80	+ 1 75	32 55	19 82				
	3975	− 6 3	S		29 59 96	+ 1 08	61 04	S		38 19 11	+ 1 72	20 83	19 79				
	3979	+ 8 53	S		31 18 37	+ 1 37	19 74	S		39 37 79	+ 1 75	39 54	19 80				
	4014	+ 16 4	N	s Q − 1 64	11 38 50 77	− 1 76	49 01	N	s Q − 1 73	11 47 10 50	− 1 69	8 81	8 19 80	m s 8 19 813	− 0 002	− 0 043	8 19 768
	4031	+ 16 16	N		41 45 73	− 1 77	43 96	N		50 5 46	− 1 68	3 78	19 82				
	4056	+ 22 43	N		47 50 82	− 1 62	49 20	N		56 10 67	− 1 68	8 99	19 79				
	4066	+ 22 5	N		50 23 18	− 1 64	21 54	N		58 43 06	− 1 68	41 38	19 84				
	4021	+ 5 30	S		11 40 10 96	− 1 98	8 98	S		11 48 30 44	− 1 71	28 73	8 19 75	m s 8 19 763	− 0 002	− 0 018	8 19 743
	4039	+ 4 6	S		44 20 59	− 2 00	18 59	S		52 40 09	− 1 72	38 37	19 78				
	4049	+ 4 17	S		46 3 84	− 2 00	1 84	S		54 23 33	− 1 72	21 61	19 77				
	4072	+ 9 21	S		51 21 26	− 1 90	19 36	S		59 40 82	− 1 71	39 11	19 75				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

MANGALORE (E) *Lat 12° 52′, Long 4h 59m 33s* : AND BOMBAY (W) *Lat 18° 54 Long 4h 51m 25s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, *By Heaviside with Telescope No 1*: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, *By Strahan with Telescope No 2*: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $H_N - S_N = + 0^s.043$, $H_S - S_S = + 0.018$	$\Delta L - \rho$
1888					h m s	s	s			h m s	s	s	m s				
Apr 4	4010	+ 38 31	N	*I P W*	11 46 35 05	+2 04	37 09	N	*I P W*	11 54 42 91	+1 19	44 10	8 7 01				
	4018	+ 41 32	N	d c + 2 3	48 5 08	+2 06	7 14	N	d c − 0 9	56 13 06	+1 12	14 18	7 04	m s 8 7 013	+ 0 002	+ 0 043	8 7 058
	4056	+ 22 43	N	b − 0 2 a − 7 7	56 3 10	+1 98	5 68	N	b − 3 4 a +36 4	12 4 11 23	+1 49	12 72	7 04				
	4066	+ 22 5	N	s Q + 1 88	58 36 12	+1 97	38 09	N	s Q + 1 67	6 43 55	+1 50	45 05	6 96				
	4030	− 4 31	S		11 49 46 61	+1 88	48 49	S		11 57 53 57	+1 89	55 46	8 6 97				
	4039	+ 4 6	S		52 33 24	+1 90	35 14	S		12 0 40 37	+1 76	42 13	6 99	m s 8 7 003	+ 0 002	+ 0 018	8 7 023
	4049	+ 4 17	S		54 16 42	+1 90	18 32	S		2 23 57	+1 7,	25 34	7 02				
	4072	+ 9 21	S		59 33 91	+1 92	35 83	S		7 41 15	+1 71	42 86	7 03				
	4107	+ 26 30	N	s Q − 1 88	12 6 17 60	−1 77	15 83	N	s Q − 1 67	12 14 24 78	−1 91	22 87	8 7 04				
	4127	+ 24 34	N		10 47 98	−1 ,8	46 20	N		18 55 07	−1 87	53 20	7 00	m s 8 7 005	+ 0 002	+ 0 043	8 7 050
	4141	+ 23 39	N		13 47 21	−1 ,8	45 43	N		21 54 25	−1 86	52 39	6 96				
	4156	+ 18 25	N		15 10 95	−1 80	9 15	N		23 17 95	−1 ,8	16 17	7 02				
	4096	+ 6 26	S		12 4 28 44	−1 84	26 60	S		12 12 35 15	−1 61	33 54	8 6 94				
	4114	+ 10 53	S		7 51 21	−1 84	49 37	S		15 58 04	−1 66	56 38	7 01	m s 8 6 968	+ 0 002	+ 0 018	8 6 988
	4134	− 3 20	S		12 32 09	−1 88	30 21	S		20 38 62	−1 46	37 16	6 95				
	4168	+ 5 56	S		16 57 88	−1 84	56 04	S		25 4 62	−1 61	3 01	6 97				
Apr 7	4010	+ 38 31	N	*I P W*	11 46 33 87	+1 89	35 76	N	*I P W*	11 54 41 58	+1 27	42 85	8 7 09				
	4018	+ 41 32	N	d c + 2 3	48 3 92	+1 91	5 83	N	d c − 1 9	56 11 75	+1 21	12 96	7 13	m s 8 7 0,3	+ 0 003	+ 0 043	8 , 119
	4056	+ 22 43	N	b + 0 9 a − 8 1	56 2 59	+1 81	4 40	N	b + 2 7 a +41 9	12 4 9 87	+1 61	11 48	7 08				
	4066	+ 22 5	N	s Q + 1 70	58 34 98	+1 81	36 79	N	s Q + 1 66	6 42 16	+1 62	43 ,8	6 99				
	4030	− 4 31	S		11 49 45 42	+1 72	47 14	S		11 57 52 19	+2 05	54 24	8 7 10				
	4039	+ 4 6	S		52 32 07	+1 74	33 81	S		12 0 38 99	+1 91	40 90	7 09	m s 8 7 093	+ 0 003	+ 0 018	8 7 114
	4049	+ 4 17	S		54 15 29	+1 74	17 03	S		2 22 18	+1 93	24 11	7 08				
	4072	+ 9 21	S		59 32 7,	+1 76	34 53	S		7 39 78	+1 85	41 63	7 10				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

MANGALORE (E) *Lat 12° 52′, Long 4ʰ 59ᵐ 33ˢ* AND BOMBAY (W) *Lat 18° 54′, Long 4ʰ 51ᵐ 25ˢ*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Heavinde, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Strahan with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl. Equations $H_N - S_N = + 0\ 043$, $H_S - S_S = + 0\ 018$	$\Delta L - \rho$
		°			h m s	s	s			h m s	s	s	m s	m s	s	s	m s
1888 Apr 7	4107	+ 26 30	N	I P W	12 6 16 09	− 1 57	14 52	N	I P W	12 14 23 33	− 1 78	21 55	8 7 03	8 7 033	+ 0 003	+ 0 043	8 7 079
	4127	+ 24 34	N	d c + 2 3	10 46 44	− 1 58	44 86	N	d c − 1 9	18 53 63	− 1 74	51 89	7 03				
	4141	+ 23 39	N	b + 0 9 a − 8 1	13 43 66	− 1 58	44 08	N	b + 2 7 a + 41 9	21 52 86	− 1 74	51 12	7 04				
				s Q − 1 70					s Q − 1 66								
	4114	+ 10 53	S		12 7 49 71	− 1 64	48 07	S		12 15 56 63	− 1 51	55 12	8 7 05	8 7 090	+ 0 003	+ 0 018	8 7 111
	4134	− 3 20	S		12 30 51	− 1 68	28 83	S		20 37 24	− 1 28	35 96	7 13				
Apr 8	4018	+ 41 32	N	I P E	11 48 3 42	+ 1 90	5 32	N	I P E	11 56 11 06	+ 1 42	12 48	8 7 16	8 7 160	+ 0 003	+ 0 043	8 7 206
	4056	+ 22 43	N	d c + 0 9	56 1 95	+ 1 84	3 ,9	N	d c − 2 9	12 4 9 50	+ 1 49	10 99	7 20				
	4066	+ 22 5	N	b + 2 6 a − 6 0	58 34 40	+ 1 83	36 23	N	b − 0 6 a + 8 3	6 41 85	+ 1 50	43 35	7 12				
				s Q + 1 71					s Q + 1 61								
	4049	+ 4 17	S		11 54 14 66	+ 1 77	16 43	S		12 2 22 05	+ 1 58	23 63	8 7 20	8 7 185	+ 0 003	+ 0 018	8 , 206
	4072	+ 9 21	S		59 32 21	+ 1 80	34 01	S		7 39 61	+ 1 57	41 18	7 17				
	4107	+ 26 30	N	s Q − 1 71	12 6 15 53	− 1 57	13 96	N	s Q − 1 61	12 14 22 94	− 1 74	21 20	8 7 24	8 7 257	+ 0 003	+ 0 043	8 7 303
	4127	+ 24 34	N		10 45 84	− 1 58	44 26	N		18 53 25	− 1 73	51 52	7 26				
	4156	+ 18 25	N		15 8 83	− 1 60	7 23	N		23 16 21	− 1 71	14 50	7 2,				
	4096	+ 6 26	S		12 4 26 30	− 1 65	24 65	S		12 12 33 59	− 1 65	31 94	8 7 29	8 , 287	+ 0 003	+ 0 018	8 7 308
	4134	− 3 20	S		12 29 91	− 1 67	28 24	S		20 37 16	− 1 62	35 54	7 30				
	4168	+ 5 56	S		16 55 74	− 1 63	54 11	S		25 3 03	− 1 65	1 38	7 27				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MANGALORE (E) *Lat* 12° 52′ *Long* 4ʰ 59ᵐ 83ˢ AND BOMBAY (W) *Lat* 18° 54′, *Long* 4ʰ 51ᵐ 26

Astronomical Date	Star		Transits Observed at E — By Heaviside, with Telescope No 1					Transits Observed at W — By Strahan, with Telescope No 2					Difference of Corrected Times (W − E)		Correction for Rate of W Clock	Corrns for Persl Equations $H_N - S_N = +0^s.043$ $H_S - S_S = +0.018$	$\Delta L + \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1888					h m s	s	s			h m s	s	s	m s	m s	s	s	m s
Apr 4	4311	+ 38 8	N	I P W	12 36 39 37	+ 2 03	41 40	N	I P W	12 44 47 61	+ 1 21	48 82	8 7 42	8 7 375	− 0 024	+ 0 043	8 7 394
	4351	+ 18 1	N	d c + 2 3 b − 0 2 a − 7 7 Q + 1 88 s	45 11 30	+ 1 96	13 26	N	d c − 0 9 b − 3 4 a + 36 4 Q + 1 67 s	53 19 02	+ 1 57	20 59	7 33				
	4358	− 2 46	S		12 46 38 21	+ 1 88	40 09	S		12 54 45 56	+ 1 88	47 44	8 7 35	8 7 350	− 0 024	+ 0 018	8 7 344
	4387	+ 21 45	N	Q − 1 88 s	12 52 45 67	− 1 79	43 88	N	Q − 1 61 s	13 0 53 04	− 1 82	51 22	8 7 34	8 7 3,0	− 0 024	+ 0 043	8 7 389
	4406	+ 18 7	N		56 24 34	− 1 80	22 54	N		4 31 60	− 1 ,1	29 89	7 35				
	4421	+ 28 27	N		58 30 76	− 1 77	28 99	N		6 38 30	− 1 89	36 41	7 42				
	4394	− 8 23	S		12 54 34 20	− 1 89	32 31	S		13 2 41 12	− 1 38	39 74	8 7 43	8 7 430	− 0 024	+ 0 018	8 7 424
Apr 7	4285	+ 39 53	N	I P W	12 31 42 64	+ 1 91	44 55	N	I P W	12 39 50 69	+ 1 23	51 92	8 7 3,	8 7 363	− 0 025	+ 0 043	8 7 381
	4304	+ 28 10	N	d c + 2 3 b + 0 9 a − 8 1	35 51 24	+ 1 83	53 07	N	d c − 1 9 b + 2 7 a + 41 9	43 58 93	+ 1 50	60 43	7 36				
	4351	+ 18 1	N	Q + 1 ,0 s	45 24 38	+ 1 81	26 19	N	Q + 1 66 s	53 31 85	+ 1 70	33 55	7 36				
	4267	+ 11 3	S		12 27 57 01	+ 1 77	58 ,8	S		12 36 4 31	+ 1 80	6 11	8 7 33	8 7 350	− 0 025	+ 0 018	8 7 343
	4277	− 0 57	S		29 54 27	+ 1 73	56 00	S		38 1 35	+ 2 00	3 35	7 35				
	4291	+ 6 34	S		33 22 32	+ 1 75	24 07	S		41 29 54	+ 1 89	31 43	7 36				
	4358	− 2 46	S		46 51 31	+ 1 72	53 03	S		54 58 37	+ 2 02	60 39	7 36				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MANGALORE (E) *Lat* 12° 52′, *Long* 4^h 59^m 33 AND BOMBAY (W) *Lat* 18° 54 *Long* 4^h 51^m 25^s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Heaviside, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Strahan, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl. Equations $H_N - S_N = + 0\ 043$ $H_S - S_S = + 0\ 018$	$\Delta L + \rho$
1868		′			h m s	s	s			h m s	s	s	m s				
Apr 7	4387	+ 21 45	N	I P W	12 52 58 41	− 1 59	56 82	N	I P W	13 1 5 86	− 1 70	4 16	8 7 34	m s 8 7 320	− 0 025	+ 0 043	8 7 338
	4406	+ 18 7	N	d c + 2 3	56 37 12	− 1 60	35 52	N	d c − 1 9	4 44 43	− 1 64	42 79	7 27				
	4421	+ 28 27	N	b + 0 9 a − 8 1	58 43 53	− 1 55	41 98	N	b + 2 7 a + 41 9	6 51 11	− 1 82	49 29	7 31				
	4458	+ 34 41	N	s Q − 1 70	13 5 21 34	− 1 53	19 81	N	s Q − 1 66	13 29 12	− 1 95	27 17	7 36				
	4394	− 8 23	S		12 54 46 99	− 1 70	45 29	S		13 2 53 84	− 1 22	52 62	8 7 33	m s 8 7 343	− 0 025	+ 0 018	8 7 336
	4431	+ 2 3	S		13 0 19 98	− 1 66	18 32	S		8 27 04	− 1 37	25 67	7 35				
	4436	+ 3 39	S		1 56 03	− 1 66	54 37	S		10 3 12	− 1 40	1 72	7 35				
	4440	+ 10 0	S		3 17 77	− 1 64	16 13	S		11 24 97	− 1 50	23 47	7 34				
Apr. 8	4285	+ 39 53	N	I P E	12 31 47 12	+ 1 90	49 02	N	I P E	12 39 55 14	+ 1 43	56 57	8 7 55	m s 8 7 528	− 0 026	+ 0 043	8 7 545
	4304	+ 28 10	N	d c + 0 9	35 55 72	+ 1 85	57 57	N	d c − 2 9	44 3 61	+ 1 47	5 08	7 51				
	4311	+ 38 8	N	b + 2 6 a − 6 0	36 57 02	+ 1 89	58 91	N	b − 0 6 a + 8 3	45 5 04	+ 1 44	6 48	7 57				
	4351	+ 18 1	N	s Q + 1 71	45 28 87	1 82	30 69	N	s Q + 1 61	53 36 66	+ 1 51	38 17	7 48				
	4267	+ 11 3	S		12 28 1 46	+ 1 81	3 27	S		12 36 9 2	+ 1 56	10 81	8 7 54	m s 8 7 508	− 0 026	+ 0 018	8 7 500
	4277	− 0 57	S		29 58 73	+ 1 78	60 51	S		38 6 37	+ 1 59	7 96	7 45				
	4291	+ 6 34	S		33 26 71	+ 1 71	28 54	S		41 34 52	+ 1 58	36 10	7 56				
	4358	− 2 46	S		46 55 83	+ 1 75	57 58	S		55 3 46	+ 1 60	5 06	7 48				
	4387	+ 21 45	N	s Q − 1 71	12 53 2 88	− 1 59	1 29	N	s Q − 1 61	13 1 10 64	− 1 72	8 92	8 7 63	m s 8 7 607	− 0 026	+ 0 043	8 7 624
	4406	+ 18 7	N		56 41 58	− 1 60	39 98	N		4 49 26	− 1 71	47 55	7 57				
	4421	+ 28 27	N		58 47 98	− 1 57	46 41	N		6 55 18	− 1 75	54 03	7 62				
	4394	− 8 23	S		12 54 51 49	− 1 68	49 81	S		12 2 58 98	− 1 61	57 37	8 7 56	m s 8 7 607	− 0 026	+ 0 018	8 7 599
	4431	+ 2 3	S		13 0 24 46	− 1 66	22 80	S		8 32 08	− 1 64	30 44	7 64				
	4436	+ 3 39	S		1 60 48	− 1 65	58 83	S		10 8 09	− 1 64	6 45	7 62				

Arc	Approximate Difference of Longitude	Intervals between Nights of Observations	Rate Corrections for both Clocks Deduced from Transits Observed at both Stations, viz : α, Corrections for the Intervals between Nights of Observations and β, Hourly Corrections for Nights of Observations, Interpolated by means of the Quantities α.								
			α at E Station for		α at W Station for		Astronomical Dates of Observations	β for		Correction to Observed Difference of Times of Transit for	
			E Clock	W Clock	E Clock	W Clock		E Clock	W Clock	E Clock	W Clock
Madras (E) and Bangalore (W)	10^m 40	1887 88					1887 88				
		December 13 to 14	− 0 30		− 0 59		December 13	− 0 019		− 0 003	
		, 14 17	− 1 77	− 50 79	− 1 59	− 56 51	„ 14	− 021	− 0 703	− 004	− 0 125
		17 19	− 1 00		− 0 68		„ 17	− 020		− 004	− 125
		, 29 30	+ 0 20	+ 1 37	+ 0 14	+ 1 29	, 19	− 018		− 003	+ 010
		Dec 30 to Jan 2	+ 0 06	+ 3 76	− 0 18	+ 3 56	, 29	+ 007	+ 055	+ 001	+ 010
							, 30	+ 003	+ 053	+ 001	+ 010
							January 2	− 001	+ 051	000	+ 009
Bangalore (E), and Nagarkoil (W)	0^m 36	January 15 to 16	+ 1 37	− 0 18	+ 1 41	− 0 09	January 15	+ 0 058	− 0 006	+ 0 001	0 000
		, 16 17	+ 1 38	− 0 20	+ 1 42	− 0 23	„ 16	+ 058	− 007	+ 001	000
		, 17 18	+ 1 55	− 0 29	+ 1 48	− 0 29	„ 17	+ 061	− 011	+ 001	000
		, 18 , 19	+ 1 56	− 0 92	+ 1 52	− 0 97	„ 18	+ 064	− 026	+ 001	000
		, 19 20	+ 1 56	− 1 11	+ 1 72	− 0 94	„ 19	+ 066	− 041	+ 001	000
							20	+ 068	− 043	+ 001	000
Madras (E) and Nagarkoil (W)	11^m 15	February 2 to 3	+ 1 22	+ 0 12	+ 0 98	− 0 08	February 2	+ 0 046	+ 0 001	+ 0 009	0 000
		, 3 , 4	+ 1 13	− 0 02	+ 1 26	+ 0 02	„ 3	+ 048	000	+ 009	000
		4 5	+ 1 09	− 0 03	+ 1 18	+ 0 04	4	+ 049	000	+ 009	000
		5 6	+ 1 41	0 00	+ 1 33	− 0 09	„ 5	+ 052	− 001	+ 010	000
		6 7	+ 1 47	− 0 05	+ 1 32	− 0 14	, 6	+ 058	− 003	+ 011	− 001
							7	+ 058	− 004	+ 011	− 001
Nagarkoil (E) and Mangalore (W)	10^m 21	February 18 to 19	0 00	+ 2 00	+ 0 29	+ 2 30	February 18	+ 0 006	+ 0 090	+ 0 001	+ 0 016
		, 19 20		+ 2 57		+ 2 32	19	+ 006	+ 096	+ 001	+ 017
		, 20 , 21		+ 2 77		+ 2 64	, 20		+ 107		+ 019
		, 21 , 22		+ 2 72		+ 2 79	, 21		+ 114		+ 020
		22 „ 24	− 0 21	+ 5 38	− 0 22	+ 5 39	„ 22	− 005	+ 114	− 001	+ 020
							24	− 005	+ 112	− 001	+ 019

Arc	Approximate Difference of Longitude	Intervals between Nights of Observations	Rate Corrections for both Clocks Deduced from Transits Observed at both Stations, viz: α, Corrections for the Intervals between Nights of Observations and β, Hourly Corrections for Nights of Observations, Interpolated by means of the Quantities α.								
			α at E Station for		α at W Station for		Astronomical Dates of Observations	β for		Correction to Observed Difference of Times of Transit for	
			E Clock	W Clock	E Clock	W Clock		E Clock	W Clock	E Clock	W Clock
Madras (E) and Mangalore (W)	21m 36s	1888					1888				
		March 5 to 7	− 1 79	+ 1 27	− 1 96	+ 1 14	March 5	− 0 039	+ 0 025	− 0 014	+ 0 009
		„ 7 „ 8	− 1 21	+ 0 66	− 1 19	+ 0 65	7	− 045	+ 026	− 016	+ 009
		„ 8 , 9	− 1 41	+ 0 39	− 1 12	+ 0 76	„ 8	− 051	+ 026	− 018	+ 009
		„ 9 , 10	− 0 63	+ 1 18	− 0 73	+ 1 02	„ 9	− 041	+ 035	− 015	+ 013
		, 10 , 12	− 0 97	+ 2 64	− 1 14	+ 2 45	„ 10	− 025	+ 049	− 009	+ 018
							, 12	− 022	+ 053	− 008	+ 019
Bellary (E) and Mangalore (W)	8m 20s	March 21 to 22	+ 3 45	+ 0 61	+ 3 45	+ 0 61	March 21	+ 0 144	+ 0 025	+ 0 020	+ 0 003
		22 , 23	+ 3 77	+ 0 48	+ 3 99	+ 0 56	22	+ 153	+ 024	+ 021	+ 003
		, 23 24		+ 0 45		+ 0 38	, 23	+ 162	+ 020	+ 023	+ 003
		, 24 , 25		+ 0 50		+ 0 42	24		+ 018	+ 024	+ 003
		, 25 , 26		+ 0 36		+ 0 36	25		+ 017		+ 002
		, 26 , 27	+ 4 65	− 0 34	+ 4 54	− 0 36	26	+ 191	000	+ 027	000
							27	+ 191	− 015	+ 027	− 002
Mangalore (E) and Bombay (W)	8m 7	April 4 to 7	+ 1 29	− 13 03	+ 1 21	− 12 99	April 4	+ 0 017	− 0 181	+ 0 002	− 0 024
		, 7 , 8	+ 0 61	− 4 45	+ 0 44	− 4 66	7	+ 020	− 185	+ 003	− 025
							, 8	+ 022	− 190	+ 003	− 026

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL AND THE RETARDATION OF SIGNALS, ρ

MADRAS (E) AND BANGALORE (W)

Astronomical Date	Instrumental Position at		Apparent Difference of Longitude by Observations with					
			E Clock = ΔL − ρ			W Clock = ΔL + ρ		
	E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1887-88			m s	m s	m s	m s	m s	m s
December 13	*I P E*	*I P E*	10 39 228	10 39 247	10 39 217			
" "	"	"	39 195	39 198				
" 14	*I P W*	"	39 407	39 442	39 409	10 39 466	10 39 551	10 39 514
" "	"	"	39 380	39 406		39 499	39 538	
" 17	"	*I P W*	39 387	39 357	39 384	39 481	39 523	39 481
" "	"	"	39 400	39 392		39 433	39 488	
" 19	*I P E*		39 108	39 060	39 102	39 234	39 236	39 241
" "	"		39 118	39 123		39 274	39 221	
" 29	"	*I P E*	39 250	39 234	39 193	39 348	39 386	39 283
" "	"	"	39 092	39 194		39 176	39 223	
" 30	"		39 205	39 237	39 167	39 274	39 328	39 267
"	"		39 107	39 119		39 209	39 258	
January 2	*I P W*	*I P W*	39 396	39 403	39 419	39 543	39 572	39 534
"			39 438	39 440		39 483	39 539	
Means	*I P E*	*I P E*	10 39 180	10 39 205	10 39 193	10 39 252	10 39 299	10 39 275
	I P W		39 394	39 424	39 409	39 483	39 545	39 514
		I P W	39 405	39 398	39 402	39 485	39 531	39 508
	I P E	"	39 113	39 092	39 102	39 254	39 228	39 241
General Means			10 39 273	10 39 280	10 39 277	10 39 369	10 39 401	10 39 385

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 10^m + \frac{1}{2}(39^s\ 277 + 39^s\ 385) = 10^m\ 39^s\ 331,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(39^s\ 385 - 39^s\ 277) = +\ 0^s\ 054$

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL

AND THE RETARDATION OF SIGNALS, ρ.

BANGALORE (E), AND NAGARKOIL (W)

Astronomical Date	Instrumental Position at E	Instrumental Position at W	Apparent Difference of Longitude by Observations with: E Clock = $\Delta L - \rho$, By N Stars	E Clock = $\Delta L - \rho$, By S Stars	E Clock = $\Delta L - \rho$, Means	W Clock = $\Delta L + \rho$, By N Stars	W Clock = $\Delta L + \rho$, By S Stars	W Clock = $\Delta L + \rho$, Means
1888			m s	m s	m s	m s	m s	m s
January 15	*I P W*	*I P W*	0 35 765	0 35 623	0 35 666	0 35 839	0 35 805	0 35 806
" "	"	"	35 695	35 581		35 819	35 760	
" 16	*I P E*	"	35 650	35 576	35 583	35 827	35 675	35 713
"	"	"	35 543	35 563		35 734	35 614	
" 17	"	*I P E*	35 650	35 525	35 581	35 759	35 742	35 776
"	"	"	35 597	35 553		35 822	35 780	
" 18	*I P W*	"	35 715	35 653	35 657	35 887	35 780	35 789
" "	"	"	35 655	35 603		35 809	35 680	
" 19	"	*I P W*	35 743	35 696	35 716	35 907	35 827	35 832
"	"	"	35 748	35 678		35 809	35 784	
20	*I P E*	"	35 630	35 568	35 622	35 809	35 777	35 785
" "	"	"	35 670	35 618		35 757	35 795	
Means	*I P W*	*I P W*	0 35 738	0 35 645	0 35 691	0 35 844	0 35 794	0 35 819
	I P E	"	35 613	35 581	35 602	35 782	35 715	35 749
	"	*I P E*	35 624	35 539	35 581	35 [illegible]91	35 [illegible]61	35 776
	I P W	"	35 685	35 628	35 657	35 848	35 730	35 789
General Means			0 35 668	0 35 598	0 35 633	0 35 816	0 35 750	0 35 783

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 0^m + \frac{1}{2}(35^s\ 633 + 35^s\ 783) = 0^m\ 35^s\ 708,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(35^s\ 783 - 35^s\ 633) = +\ 0^s\ 075$

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL AND THE RETARDATION OF SIGNALS, ρ.

MADRAS (E), AND NAGARKOIL (W)

Astronomical Date	Instrumental Position at E	Instrumental Position at W	Apparent Difference of Longitude by Observations with E Clock = $\Delta L - \rho$: By N Stars	E Clock: By S Stars	E Clock: Means	W Clock = $\Delta L + \rho$: By N Stars	W Clock: By S Stars	W Clock: Means
1888			m s	m s	m s	m s	m s	m s
February 2	*I P E*	*I P E*	11 14 949	11 14 940	11 14 923	11 15 021	11 14 911	11 14 983
" "		"	14 835	14 967		15 018	14 981	
" 3	*I P W*	"	15 125	15 027	15 092	15 213	15 216	15 193
" "	"		15 235	14 980		15 198	15 146	
" 4	"	*I P W*	15 075	14 970	15 041	15 191	15 108	15 150
"	"		15 092	15 027		15 178	15 121	
" 5	*I P E*		14 818	14 726	14 800	14 893	14 886	14 925
" "		"	14 806	14 848		14 926	14 993	
" 6	"	*I P E*	14 852	14 827	14 881	14 962	14 995	15 007
" "	"	"	14 952	14 892		15 017	15 055	
7	*I P W*	"	15 009	14 912	15 006	15 175	15 192	15 167
" "	"	"	15 119	14 982		15 127	15 172	
Means	*I P E*	*I P E*	11 14 897	11 14 907	11 14 902	11 15 005	11 14 986	11 14 995
	I P W		15 122	14 975	15 049	15 178	15 182	15 180
		I P W	15 084	14 999	15 041	15 185	15 115	15 150
	I P E		14 812	14 787	14 800	14 910	14 940	14 925
General Means			11 14 9[illegible]9	11 14 917	11 14 948	11 15 070	11 15 056	11 15 063

Whence $\Delta L = \frac{1}{2}\left\{(\Delta L - \rho) + (\Delta L + \rho)\right\} = 11^m + \frac{1}{2}(14^s\ 948 + 15^s\ 063) = 11^m\ 15^s\ 006,$

$$\rho = \frac{1}{2}\left\{(\Delta L + \rho) - (\Delta L - \rho)\right\} = \frac{1}{2}(15^s\ 063 - 14^s\ 948) = +\ 0^s\ 058$$

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL AND THE RETARDATION OF SIGNALS, ρ

NAGARKOIL (E) AND MANGALORE (W)								
Astronomical Date	Instrumental Position at		Apparent Difference of Longitude by Observations with					
			E Clock = $\Delta L - \rho$			W Clock = $\Delta L + \rho$		
	E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1888			m s	m s	m s	m s	m s	m s
February 18	*I P E*	*I P E*	10 21 138	10 21 131	10 21 107	10 21 226	10 21 241	10 21 191
" "	"	"	21 103	21 056		21 163	21 133	
" 19	*I P W*	"	21 021	21 043	21 027	21 154	21 152	21 097
"		"	21 031	21 013		21 034	21 049	
" 20	"	*I P W*				21 169	21 181	21 197
"	"					21 209	21 229	
" 21	*I P E*	"				21 250	21 262	21 252
" "	"	"				21 255	21 242	
" 22	"	"	21 091	21 184	21 161	21 217	21 229	21 257
" "	"	"	21 181	21 189		21 294	21 289	
" 24	*I P W*	"	21 101	21 114	21 101	21 219	21 219	21 183
" "	"	"	21 079	21 111		21 141	21 151	
Means	*I P E*	*I P E*	10 21 121	10 21 094	10 21 107	10 21 195	10 21 187	10 21 191
	I P W	"	21 026	21 028	21 027	21 094	21 101	21 097
	"	*I P W*	21 090	21 113	21 101	21 185	21 195	21 190
	I P E	"	21 136	21 187	21 161	21 254	21 256	21 255
General Means			10 21 093	10 21 105	10 21 099	10 21 182	10 21 185	10 21 183

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 10^m + \frac{1}{2}(21^s\,099 + 21^s\,183) = 10^m\,21^s\,141,$

$$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(21^s\,183 - 21^s\,099) = +\,0^s\,042$$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL

AND THE RETARDATION OF SIGNALS, ρ

MADRAS (E) AND MANGALORE (W)

Astronomical Date	Instrumental Position at		Apparent Difference of Longitude by Observations with					
			E Clock = $\Delta L - \rho$			W Clock = $\Delta L + \rho$		
	E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1888			m s	m s	m s	m s	m s	m s
March 5	*I P E*	*I P W*	21 35 996	21 35 958	21 35 988	21 35 994	21 36 079	21 36 037
" "	"	"	35 981	36 015		35 984	36 091	
" 7	*I P W*	"	36 181	36 259	36 231	36 356	36 294	36 280
" "	"	"	36 231	36 254			36 191	
" 8	"	*I P E*	36 134	36 194	36 164	36 226	36 286	36 264
" "	"					36 256	36 289	
" 9	*I P E*	"	35 837	35 814	35 891	36 040	36 048	36 048
" "	"	"	35 935	35 977		36 100	36 005	
" 10	"	*I P W*	36 023	36 016	36 026	36 103	36 105	36 128
" "	"	"	36 023	36 041		36 175	36 128	
" 12	*I P W*	"	36 214	36 202	36 208	36 426	36 341	36 401
" "	"	"				36 399	36 438	
Means	*I P E*	*I P W*	21 36 006	21 36 008	21 36 007	21 36 064	21 36 101	21 36 082
	I P W	"	36 209	36 238	36 223	36 394	36 316	36 355
	"	*I P E*	36 134	36 194	36 164	36 241	36 288	36 264
	I P E	"	35 886	35 896	35 891	36 070	36 027	36 048
General Means			21 36 059	21 36 084	21 36 071	21 36 192	21 36 183	21 36 187

Whence $\Delta L = \frac{1}{2}\left\{(\Delta L - \rho) + (\Delta L + \rho)\right\} = 21^m + \frac{1}{2}(36^s\ 071 + 36^s\ 187) = 21^m\ 36^s\ 129,$

$$\rho = \frac{1}{2}\left\{(\Delta L + \rho) - (\Delta L - \rho)\right\} = \frac{1}{2}(36^s\ 187 - 36^s\ 071) = +\ 0^s\ 058$$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL

AND THE RETARDATION OF SIGNALS, ρ

BELLARY (E) AND MANGALORE (W)

Astronomical Date		Instrumental Position at E	Instrumental Position at W	Apparent Difference of Longitude by Observations with E Clock = $\Delta L - \rho$: By N Stars	By S Stars	Means	W Clock = $\Delta L + \rho$: By N Stars	By S Stars	Means
1888				m s	m s	m s	m s	m s	m s
March	21	*I P E*	*I P E*	8 19 555	8 19 467	8 19 512	8 19 645	8 19 658	8 19 643
	"		,	19 524	19 500		19 640	19 628	
	22		"	19 531	19 568	19 560	19 723	19 698	19 674
		"	,	19 558	19 581		19 628	19 645	
	23		"	19 448	19 462	19 471	19 673	19 653	19 682
	"		,	19 480	19 495		19 693	19 710	
,	24	*I P W*	"		19 586	19 586	19 640	19 715	19 671
		,	"				19 657	19 673	
	25	,	*I P W*				19 689	19 721	19 715
,					.		19 729	19 721	
	26			19 617	19 619	19 629	19 817	19 ,62	19 780
		"		19 647	19 632		19 782	19 757	
,	27	*I P E*		19 652	19 667	19 639	19 798	19 783	19 773
,	,			19 604	19 632		19 768	19 743	
Means		*I P E*	*I P E*	8 19 516	8 19 512	8 19 514	8 19 667	8 19 665	8 19 666
		I P W			19 586	19 586	19 649	19 694	19 671
		,	*I P W*	19 632	19 626	19 629	19 754	19 740	19 747
		I P E	,	19 628	19 650	19 639	19 783	19 763	19 773
General Means				8 19 592	8 19 593	8 19 592	8 19 713	8 19 716	8 19 714

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 8^m + \frac{1}{2}(19^s\ 592 + 19^s\ 714) = 8^m\ 19^s\ 653,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(19^s\ 714 - 19^s\ 592) = +\ 0^s\ 061$

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL

AND THE RETARDATION OF SIGNALS, ρ

MANGALORE (E) AND BOMBAY (W)

Astronomical Date	Instrumental Position at E	Instrumental Position at W	E Clock = ΔL − ρ: By N Stars	E Clock = ΔL − ρ: By S Stars	E Clock = ΔL − ρ: Means	W Clock = ΔL + ρ: By N Stars	W Clock = ΔL + ρ: By S Stars	W Clock = ΔL + ρ: Means
1888			m s	m s	m s	m s	m s	m s
April 4	*I P W*	*I P W*	8 7 038	8 7 023	8 7 030	8 7 394	8 7 344	8 7 388
			7 050	6 988		7 389	7 424	
7			7 119	7 114	7 106	7 381	7 343	7 350
			7 079	7 111		7 338	7 336	
8	*I I E*	*I P E*	7 206	7 206	7 256	7 545	7 500	7 567
			7 303	7 308		7 624	7 599	
Means	*I P W*	*I P W*	8 7 077	8 7 059	8 7 068	8 7 376	8 7 362	8 7 369
	I I E	*I P E*	7 255	7 257	7 256	7 585	7 550	7 567
General Means			8 7 166	8 7 158	8 7 162	8 7 481	8 7 456	8 7 468

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 8^m + \frac{1}{2}(7^s\ 162 + 7^s\ 468) = 8^m\ 7^s\ 315,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(7^s\ 468 - 7^s\ 162) = +\ 0^s\ 153$

ELECTRO-TELEGRAPHIC LONGITUDES

1889-90.

INDIAN ARCS.

ABSTRACT OF THE OBSERVATIONS

AND

REDUCTION OF THE RESULTS.

NOTE

The Explanation of *Table I*, given on page 2, applies equally to the observations of 1889 90, in which the same Telescopes were used with the same Micrometers and the same wire systems

Astronl. Date	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks
			d	d	d	d	d	d				d	d	d	d	d	d	
1889 Nov 15	AGRA (Telescope No 1)	I P E	40 6				42 0			MOOLTAN (Telescope No 2)	I P W	61 6				60 7		
			40 6	40 0	−3 0	−3 8	43 0	−6 2				64 4	60 0	−1 6	−2 4	58 7	−1 4	
			39 2				44 6					62 3				61 1		
„ 16		I P W	33 5				34 0				I P W	61 5				59 5		
			35 8	40 0	+3 0	+2 2	33 9	−3 3				62 0	60 0	−1 6	−2 4	59 1	−2 0	
			36 2				33 2					62 7				60 3		
„ 17		I P W	34 8				30 9				I P E	61 4				58 3		
			34 0	40 0	+3 0	+2 2	31 1	−0 9				59 3	60 0	+1 6	+0 8	58 0	+3 4	
			34 2				31 2					60 6				58 2		
„ 18		I P E	41 0	40 0	−3 0	−3 8	38 1	−0 2	Mean C		I P E	61 1				59 0		Mean C_0
			38 2				36 2		*I P E* = 39 6			61 0	60 0	+1 6	+0 8	58 3	+2 6	*I P E* = 60 4
„ 19		I P E	40 0				40 0		*I P W* = 34 3			59 3				59 7		*I P W* = 62 7
			39 2	40 0	−3 0	−3 8	40 3	−4 4	General		I P E	60 8				57 6		General
			39 7				43 8		Mean = 37 0			60 4	60 0	+1 6	+0 8	58 6	+3 3	Mean = 61 6
„ 20		I P E	37 8				40 2					61 9				58 6		
			39 7	40 0	−3 0	−3 8	40 8	−3 5			I P W	62 [illegible]				63 2		
			40 0				40 4					62 9	60 0	−1 6	−2 4	65 5	+3 0	
„ 21		I P W	34 0				37 0					60 7				65 0		
			33 9	40 0	+3 0	+2 2	35 4	−1 4			I P W	63 6				63 4		
			34 8				34 5					64 2	60 0	−1 6	−2 4	65 0	+2 8	
„ 22		I P W	32 8				36 2					62 9				64 9		
			34 3	40 0	+3 0	+2 2	35 7	−1 3			I P E	58 1				58 3		
			33 4				35 3					60 2	60 0	+1 6	+0 8		+3 3	
												60 3				58 2		
Dec 1	AGRA (Telescope No 1)	I P E	39 6				40 7			KARACHI (Telescope No 2)	I P W	58 5				58 9		
			41 5	40 0	−1 9	−2 7	43 1	−4 5				59 7	60 0	−0 6	−1 4	60 0	−1 3	
			39 1				44 1					58 0				58 9		
„ 2		I P W	35 9				35 9		Mean C		I P W	60 1				59 9		Mean C
			36 9	40 0	+1 9	+1 1	35 9	−3 1				58 5	60 0	−0 6	−1 4	59 4	−1 3	
			38 0				33 3		*I P E* = 40 0			59 6				58 6		*I P E* = 61 6
„ 3		I P W	35 7				35 4		*I P W* = 36 1		I P E	62 7				60 3		*I P W* = 59 5
			35 3	40 0	+1 9	+1 1	34 9	−3 2	General Mean = 38 1			61 5	60 0	+0 6	−0 2	60 3	0 0	General Mean = 60 6
			34 9				34 5					61 2				61 2		
„ 4		I P E	40 8				39 6				I P E	62 2				62 0		
			41 7	40 0	−1 9	−2 7	41 3	−3 0				62 6	60 0	+0 6	−0 2	63 9	−2 4	
			38 9				42 5					60 5				63 0		

Astronl Date	Station	Instrumental Position	Collimation C_0	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C_0	Collimation c_1	Collimation c	Level M	Level b	Remarks
			d	d	d	d	d	d				d	d	d	d	d	d	
1889 Dec 5	AGRA (Telescope No 1)	*I P E*	38 8				40 1			KARACHI (Telescope No 2)	*I P E*	61 5				64 2		
			39 0	40 0	−1 9	−2 7	40 9	−3 0	Mean C			60 9	60 0	+0 6	−0 2	64 1	−4 2	Mean C_0
			40 4				42 3		*I P E* = 40 0			61 4				66 0		*I P E* = 61 6
„ 6		*I P W*	35 9				37 1		*I P W* = 36 1		*I P W*	60 0				58 2		*I P W* = 59 5
			36 2	40 0	+1 9	+1 1	35 8	−2 2	General Mean = 38 1			60 2	60 0	−0 6	−1 4	58 1	−2 5	General Mean = 60 6
			36 4				34 9					61 2				58 0		
Dec 28	AGRA (Telescope No 1)	*I P E*	38 4				41 3			KALIANPUR (Telescope No 2)	*I P W*	56 9				59 0		
			41 1	40 0	−2 3	−3 1	40 5	−3 7				55 9	60 0	+2 7	+1 9	59 7	+2 2	
			38 6				42 5					57 1				59 7		
„ 29		*I P W*	34 8				36 4				*I P W*	56 4				60 8		
			36 2	40 0	+2 3	+1 5	35 2	−1 7				56 3	60 0	+2 7	+1 9	59 7	+3 3	
			37 1				36 4					56 8				61 2		
30		*I P W*	38 5				33 8		Mean C_0		*I P E*	57 4				60 0		Mean C_0
			37 1	40 0	+2 3	+1 5	33 5	−4 5	*I P E* = 39 0			57 9	60 0	−2 7	−3 5	60 1	−3 0	*I P E* = 57 9
			36 8				32 4		*I P W* = 36 4			58 3				60 8		*I P W* = 56 6
, 31		*I P W*	36 0				38 1		General Mean = 37 7		*I P E*	57 6				60 1		General Mean = 57 3
			35 2	40 0	+2 3	+1 5	37 5	+0 3				57 8	60 0	−2 7	−3 5	60 5	−3 2	
			35 6				38 3					58 0				60 9		
1890 Jan 1		*I P E*	39 6				41 2				*I P E*	58 0				60 2		
			37 3	40 0	−2 3	−3 1	40 5	−3 4				58 5	60 0	−2 7	−3 5	60 6	−3 1	
			38 2				41 7					57 5				60 5		
, 2		*I P E*	39 9				39 9				*I P W*	55 3				59 1		
			39 1	40 0	−2 3	−3 1		−3 9				57 0	60 0	+2 7	+1 9	59 0	+1 8	
			38 9				43 3					57 6				59 2		
Jan 15	KALIANPUR (Telescope No 2)	*I P W*	55 2				55 7			BOMBAY (Telescope No 1)	*I P E*	36 5				34 2		
			56 3	55 0	−1 0	−1 8	55 5	−0 6				37 5	35 0	+0 9	+0 1	34 6	+1 3	
			56 9				55 1		Mean C			37 1				34 9		Mean C_0
, 17		*I P W*	55 3				54 9		*I P E* = 56 2		*I P W*	35 8				37 1		*I P E* = 36 7
			56 6	55 0	−1 0	−1 8	54 8	−1 5	*I P W* = 55 8			34 8	35 0	−0 9	−1 7	37 3	+1 3	*I P W* = 35 1
			55 9				53 7		General Mean = 56 0			34 7				37 1		General Mean = 35 9
, 18		*I P E*	55 2				56 1				*I P W*	34 2				37 2		
			56 1	55 0	+1 0	+0 2	55 4	+0 2				34 3	35 0	−0 9	−1 7	37 1	+1 2	
			56 3				55 8					35 4				37 0		

Astronl Date	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks
			d	d	d	d	d	d				d	d	d	d	d	d	
1890 Jan 19	KALIANPUR (Telescope No 2)	*I P E*	55 9				55 6			BOMBAY (Telescope No 1)	*I P E*	37 0				37 0		
			56 6	55 0	+1 0	+0 2	54 7	+0 5				37 3	35 0	+0 9	+0 1	38 0	−2 0	
			56 2				56 2		Mean C_0			37 3				38 6		Mean C_0
„ 20		*I P E*	56 3				55 6				*I P E*	35 7				36 8		
			56 6	55 0	+1 0	+0 2	54 3	+1 1	*I P E* = 56 2			36 6	35 0	+0 9	+0 1	37 3	−1 5	*I P E* = 36 7
			57 0				54 8		*I P W* = 55 8			35 6				38 0		*I P W* = 35 1
„ 21		*I P W*	55 5				53 7		General Mean = 56 0		*I P W*	35 9				37 0		General Mean = 35 9
			56 3	55 0	−1 0	−1 8	54 0	−2 0				36 4	35 0	−0 9	−1 7	37 0	+1 1	
			54 5				54 2					34 6				37 0		
Feb 4	JUBBULPORE (Telescope No 1)	*I P E*	34 6				32 0			KALIANPUR (Telescope No 2)	*I P W*	59 2				54 6		
			33 2	40 0	−3 6	−4 4	31 6	+5 1				58 1	60 0	+2 3	+1 5	54 5	−3 1	
			32 9				30 3					58 6				54 8		
„ 5		*I P W*	38 3				39 8				*I P W*	57 6				55 5		
			36 5	40 0	+3 6	+2 8	38 5	+3 1				57 4	60 0	+2 3	+1 5	56 8	−1 5	
			40 1				40 3					56 9				56 4		
„ 6		*I P W*	37 2				38 8				*I P E*	57 7				60 7		
			39 2	40 0	+3 6	+2 8	38 2	+1 9	Mean C_0			58 2	60 0	−2 3	−3 1	60 2	−3 1	Mean C_0
			39 4				37 9		*I P E* = 33 8			56 5				61 4		*I P E* = 57 7
7		*I P E*	34 9				34 8		*I P W* = 39 0		*I P E*	57 8				57 4		*I P W* = 57 6
			34 0	40 0	−3 6	−4 4	35 3	+1 6	General Mean = 36 4			58 5	60 0	−2 3	−3 1	57 0	+0 3	General Mean = 57 7
			33 7				34 3					57 2				57 8		
„ 8		*I P E*	33 8				31 1				*I P E*	57 3				57 3		
			34 2	40 0	−3 6	−4 4	31 1	+5 3				58 4	60 0	−2 3	−3 1	56 6	+0 8	
			32 5				31 2					57 6				56 9		
„ 9		*I P W*	39 9				36 7				*I P W*	57 8				57 1		
			41 9	40 0	+3 6	+2 8	35 2	−1 0				57 6	60 0	+2 3	+1 5	57 5	−0 6	
			38 5				34 3					55 9				56 7		
												55 8						
Mar 24	MOOLTAN (Telescope No 1)	*I P E*	34 4				34 2			QUETTA (Telescope No 2)	*I P E*	66 3				60 9		
			32 7	35 0	−3 5	−4 3	33 3	−2 1	Mean C_0			65 9	60 0	+7 0	+6 2	60 9	+6 0	Mean C_0
							33 4		*I P E* = 33 5			66 4				61 3		*I P E* = 66 5
„ 27		*I P W*	30 2				28 1		*I P W* = 29 5		*I P E*	66 5				61 8		*I P W* = 67 5
			29 4	35 0	+3 5	+2 7	27 9	−3 1	General Mean = 31 5			66 8	60 0	+7 0	+6 2	62 3	+4 4	General Mean = 67 0
							29 1					66 7				63 7		

Astronl Date	Station	Instrumental Position	Collimation				Level		Remarks
			C_0	C_s	c_1	c	M	b	
			d	d	d	d	d	d	
1890 Mar 28	MOOLTAN (Telescope No 1)	I P W	29 9	35 0	+3 5	+2 7	28 0	−2 7	
			28 5				29 5		
" 30		I P E	32 2	35 0	−3 5	−4 3	34 7	−3 0	Mean C_s I P E = 33 5 I P W = 29 5 General Mean = 31 5
			33 8				34 3		
" 31		I P E	33 3	35 0	−3 5	−4 3	34 3	−3 1	
			34 3				34 9		
Apr 7	KARACHI (Telescope No 1)	I P E	20 5	20 0	−0 3	−1 1	18 4	+0 4	
			21 6				20 1		
" 8		I P W	20 5	20 0	+0 3	−0 5	19 4	−1 3	
			20 4				17 4		
" 9		I P W	17 8	20 0	+0 3	−0 5	19 0	−0 3	Mean C I P E = 20 1 I P W = 19 3 General Mean = 19 7
			18 5				19 7		
10		I P E	20 2	20 0	−0 3	−1 1	16 2	+2 9	
			19 2				17 3		
, 11		I P E	18 6	20 0	−0 3	−1 1	15 4	+3 8	
			20 1				16 3		
12		I P W	18 9	20 0	+0 3	−0 5	19 8	−0 4	
			19 6				18 8		

Astronl Date	Station	Instrumental Position	Collimation				Level		Remarks
			C_0	C_s	c_1	c	M	b	
			d	d	d	d	d	d	
1890 Mar 28	QUETTA (Telescope No 2)	I P W	66 9				65 1		
			65 8	60 0	−7 0	−7 8	64 0	−2 7	
			66 6				63 8		Mean C_s
" 30		I P W	68 2				63 3		I P E = 66 5
			68 2	60 0	−7 0	−7 8	62 1	−4 2	I P W = 67 5
			69 3				63 1		General Mean = 67 0
" 31		I P W	67 2				63 1		
			67 1	60 0	−7 0	−7 8	62 4	−4 5	
			67 8				62 0		
Apr 7	QUETTA (Telescope No 2)	I P E	63 8				61 8		
			63 3	60 0	+6 2	+5 4	61 4	+4 7	
			64 6				61 3		
" 8		I P E	64 3				62 4		
			64 0	60 0	+6 2	+5 4	60 3	+4 7	
			63 8				61 7		
" 9		I P W	67 6				60 4		
			67 0	60 0	−6 2	−7 0	59 5	−6 3	Mean C
			67 8				59 8		I P E = 64 0
10		I P W	68 9				61 2		I P W = 68 4
			68 9	60 0	−6 2	−7 0	58 9	−6 1	General Mean = 66 2
			69 9				60 2		
, 11		I P E	61 4				60 4		
			62 7	60 0	+6 2	+5 4	61 6	+4 9	
			64 5				61 9		
			63 3						
12		I P E	64 6				66 2		
			64 2	60 0	+6 2	+5 4	65 4	+0 2	
			66 1				66 3		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No. of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pers Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a	Adopted Value of Deviation Correction
									h m s	s	s	s	s	s	h m s	m s	d	d
AGRA (E) AND MOOLTAN (W)	AGRA (Latitude 27 10)	1889																
				E	1,9 Gr 72	U	6	−0 078	1 51 32 1	−0 39	−0 40	+1 67		32 98	1 51 52 8	+0 19 82	−5 8	
				,	1324 ,,	L	5	+0 091	2 27 22 5	+0 36	+0 14	−1 67	+0 23	21 56	2 27 40 4	+0 18 84		
		Nov 15	*I P E*	W	Groom 2283	L	2	+0 497	2 45 50 7	+2 08	+1 43	+1 67		55 88	3 12 29 5	+26 33 62	+3 2	−1 0
				,	326 Gr 72	U	2	−0 298	3 4 16 4	−1 32	−1 10	+1 67	−0 09	15 56	3 30 46 6	+26 31 04	−0 4	
					1424 ,,	L	6	+0 105	3 21 25 0	+0 41	+0 18	−1 67	−0 18	23 74	3 47 54 6	+26 30 86		
				E	179 Gr 72	U	6	−0 078	1 51 22, 3	+0 22	−0 21	+1 60		23 91	1 51 52 8	+0 28 89	*Rejected*	
					1324 ,,	L	2	+0 091	2 26 49 3	−0 21	+0 0,	−1 60	+0 23	47 ,9	2 27 40 4	+0 52 61		
		, 16	*I P W*	W	Groom 2283	L	2	+0 4)7	2 45 57 9	−1 20	+0 ,6	1 60		59 06	3 12 29 6	+26 30 54	+15 0	+15 ,
					326 Gr 72	U	2	−0 298	3 4 26 3	+0 76	−0 59	+1 60	−0 09	27 98	3 30 46 6	+26 18 62	+16 4	
				,,	1424 ,,	L	6	+0 105	3 21 31 3	−0 24	+0 10	−1 60	−0 18	29 38	3 47 54 6	+26 25 22		
				E	179 Gr 72	U	7	−0 0,8	1 51 13 6	+0 22	−0 38	+1 60		15 04	1 51 52 8	+0 37 ,6	+7 0	
					1324 ,,	L	3	+0 091	2 27 2 9	−0 21	+0 13	−1 60	+0 23	1 45	2 27 40 4	+0 38 95		
		,, 17	*I P W*	W	326 ,,	U	2	−0 298	3 4 35 7	+0 76	−1 05	+1 60		37 01	3 30 46 7	+26 9 69	+21 0	+14 0
				,	1424 ,,	L	6	+0 105	3 21 38 2	−0 24	+0 17	−1 60	−0 09	36 44	3 47 54 6	+26 18 16		
				E	179 Gr 72	U	7	−0 0,8	1 50 57 7	−0 39	−0 01	+1 60		58 90	1 51 52 8	+0 53 90		
		, 18	*I P E*		1324 ,,	L	5	+0 091	2 27 0 0	+0 36	0 00	−1 60	+0 23	58 99	2 27 40 4	+0 41 41	−73 9	−73 9
				E	179 Gr 72	U	6	−0 078	1 50 54 2	−0 39	−0 29	+1 60		55 12	1 51 52 7	+0 57 58	−5 1	
				,	1324 ,,	L	4	+0 091	2 26 44 6	+0 36	+0 10	−1 60	+0 23	43 69	2 27 40 4	+0 56 71		
		,, 19	*I P E*	W	326 ,,	U	2	−0 298	3 4 46 9	−1 32	−0 ,8	+1 60		46 40	3 30 46 8	+26 0 40	+1 4	−1 9
				,,	1424 ,,	L	5	+0 10,	3 21 54 7	+0 41	+0 13	−1 60	−0 09	53 55	3 4, 54 5	+26 0 95		
				E	179 Gr 72	U	7	−0 078	1 50 45 4	−0 39	−0 23	+1 61		46 39	1 51 52 7	+1 6 31	+7 3	
					1324 ,,	L	4	+0 091	2 26 33 9	+0 36	+0 08	−1 61	+0 23	32 96	2 27 40 5	+1 7 54		
		,, 20	*I P E*	W	326 ,,	U	2	−0 298	3 4 59 0	−1 32	−0 62	+1 61		58 67	3 30 46 8	+25 48 13	+17 3	+12 3
				,	1424 ,	L	5	+0 105	3 22 0 6	+0 41	+0 10	−1 61	−0 09	59 41	3 47 54 5	+25 55 09		
				W	326 Gr 72	U	1	−0 298	3 4 57 7	+0 76	−0 25	+1 54		59 75	3 30 46 9	+25 47 15		
		,, 21	*I P W*		1424 ,,	L	5	+0 105	3 22 10 4	−0 24	+0 04	−1 54	−0 09	8 57	3 47 54 5	+25 45 93	−3 0	−3 0
				E	179 Gr 72	U	4	−0 0,8	1 50 25 3	+0 22	−0 08	+1 51		26 95	1 51 52 7	+1 25 75	−6 4	
				,	1324 ,,	L	5	+0 091	2 26 17 3	−0 21	+0 03	−1 51	+0 23	15 84	2 27 40 5	+1 24 66		
		,, 22	*I P W*	W	326 ,,	U	2	−0 298	3 5 3 8	+0 76	−0 23	+1 51		5 84	3 30 46 9	+25 41 06	−4 9	−5 6
				,,	1424 ,,	L	5	+0 105	3 22 17 2	−0 24	+0 04	−1 51	−0 09	15 40	3 47 54 5	+25 39 10		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a	Adopted Value of Deviation Correction
AGRA (E) AND MOOLTAN (W)	MOOLTAN (Latitude 30 11)	1889							h m s	s	s	s	s	s	h m s	m s	d	d
				E	179 Gr 72	U	0	−0 075							1 51 52 8			
				„	1324 „	L	5	+0 090	2 53 43 1	+0 23	+0 04	−1 71		41 66	2 27 40 4	−26 1 26		
		Nov 15	I P W	W	Groom 2283	L	3	+0 484	3 12 16 6	+1 32	+0 36	+1 71		19 99	3 12 29 1	+ 0 9 51	− 8 1	−11 4
				„	326 Gr 72	U	6	−0 288	3 30 30 3	−0 83	−0 27	+1 71	−0 09	30 82	3 30 46 6	+ 0 15 78	−14 6	
					1424 „	L	5	+0 103	3 47 46 1	+0 26	+0 05	−1 71	−0 18	44 52	3 47 54 6	+ 0 10 08		
				E	179 Gr 72	U	1	−0 075	2 17 41 2	−0 24	−0 14	+1 71		42 53	1 51 52 8	−25 49 73	−16 2	
				,	1324 „	L	5	+0 090	2 53 34 0	+0 23	+0 0	−1 71	+0 23	32 80	2 27 40 4	−25 52 40		
		„ 16	I P W	W	Groom 283	L	3	+0 484	3 12 26 2	+1 32	+0 51	+1 71		29 74	3 12 29 6	− 0 0 14	− 9 1	−12 1
					326 Gr 72	U	1	−0 288	3 30 39 3	−0 83	−0 39	+1 71	−0 09	39 70	3 30 46 6	+ 0 6 90	−11 1	
				„	1424 „	L	5	+0 103	3 47 53 6	+0 26	+0 07	−1 71	−0 18	52 04	3 47 54 6	+ 0 2 56		
				E	179 Gr 72	U	7	−0 075	2 47 31 2	+0 08	+0 23	+1 70		33 21	1 51 52 8	−25 40 41	− 5 2	
				,	1324 ,	L	1	+0 090	2 53 23 3	−0 08	−0 09	−1 70	+0 23	21 66	2 27 40 4	−25 41 26		
		„ 17	I P E	W	Groom 2283	L	5	+0 484	3 12 30 2	−0 44	−0 87	+1 70		30 59	3 12 29 6	− 0 0 99	+ 5 7	+ 1 7
					326 Gr 72	U	1	−0 288	3 30 49 5	+0 28	+0 66	+1 70	−0 09	52 05	3 30 46 7	− 0 5 35	+ 4 7	
				,	1424 „	L	6	+0 103	3 48 6 2	−0 09	−0 12	−1 70	−0 18	58 11	3 47 54 6	− 0 3 51		
				E	179 Gr 72	U	8	−0 075	2 17 21 8	+0 08	+0 18	+1 70		23 76	1 51 52 8	−25 30 96	− 5 6	
					1324 „	L	3	+0 090	2 53 13 9	−0 08	−0 07	−1 70	+0 23	12 28	2 27 40 4	−25 31 88		
		„ 18	I P E	W	326 „	U	2	−0 288	3 30 54 3	+0 28	+0 50	+1 70		56 78	3 30 46 7	− 0 10 08	− 4 2	− 4 9
				„	1424 „	L	8	+0 103	3 48 8 3	−0 09	−0 09	−1 70	−0 09	6 33	3 47 54 6	− 0 11 73		
				E	179 Gr 72	U	5	−0 075	2 17 11 5	+0 08	+0 23	+1 68		13 49	1 51 52 7	−25 20 79	−10 3	
					Groom 2283	L	5	+0 484	3 37 55 6	−0 44	−0 84	+1 68	+0 14	56 14	3 12 29 6	−25 26 54		
		„ 19	I P E	W	326 Gr 72	U	2	−0 288	3 30 59 8	+0 28	+0 64	+1 68		2 40	3 30 46 8	− 0 15 60	−10 8	−10 5
				,	1424 „	L	8	+0 103	3 48 16 3	−0 09	−0 11	−1 68	−0 09	14 33	3 47 54 5	− 0 19 83		
				E	179 Gr 72	U	7	−0 075	2 17 2 7	−0 24	+0 21	+1 65		4 32	1 51 52 7	−25 11 62	−17 6	
				,	1324 „	L	3	+0 090	2 52 56 3	+0 23	−0 08	−1 65	+0 23	55 03	2 27 40 5	−25 14 53		
		„ 20	I P W	W	Groom 2283	L	5	+0 484	3 12 59 4	+1 32	−0 77	+1 65		1 60	3 12 29 6	− 0 32 00	−12 2	−14 0
				„	326 Gr 72	U	3	−0 288	3 31 8 1	−0 83	+0 58	+1 65	−0 09	9 41	3 30 46 8	− 0 22 61	−12 3	
				,	1424 „	L	10	+0 103	3 48 23 6	+0 26	−0 10	−1 65	−0 18	21 93	3 47 54 5	− 0 27 43		
				W	179 Gr 72	U	5	−0 075	1 52 23 7	−0 24	+0 19	+1 65		25 30	1 51 52 7	− 0 32 60	− 2 9	
		„ 21	I P W		Groom 2283	L	4	+0 484	3 13 2 0	+1 32	−0 71	+1 65	−0 42	3 84	3 12 29 6	− 0 34 24		− 0 7
					326 Gr 72	U	2	−0 288	3 31 19 5	−0 83	+0 54	+1 65		20 86	3 30 46 9	− 0 33 96	+ 1 6	
				,	1424 „	L	5	+0 103	3 48 29 4	+0 26	−0 10	−1 65	−0 09	27 82	3 47 54 5	− 0 33 32		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for: Collimation	Level	Pen Equation Q	Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Values of Deviation Correction a	Adopted value of Deviation Correction
									h m s	s	s	s	s	s	h m s	m s	d	d
AGRA (E) AND MOOLTAN (W)	MOOLTAN (Latitude 30 11)	1889 Nov 22		E	179 Gr 72	U	8	−0 075	2 16 44 7	+0 08	+0 23	+1 69		46 70	1 51 52 7	−24 54 00	−1 6	
				,,	1324 ,,	L	5	+0 090	2 52 36 4	−0 08	−0 09	−1 69	+0 23	34 77	2 27 40 5	−24 54 27		
			I P E	W	Groom 2283	L	4	+0 484	3 13 7 2	−0 44	−0 84	+1 69		7 61	3 12 29 6	−0 38 01	+4 6	+1 8
				,,	326 Gr 72	U	3	−0 288	3 31 25 9	+0 28	+0 64	+1 69	−0 09	28 42	3 30 46 9	−0 41 52	+2 3	
				,,	1424 ,,	L	6	+0 103	3 48 37 2	−0 09	−0 11	−1 69	−0 18	35 13	3 47 54 5	−0 40 63		
AGRA (E) AND KARACHI (W)	AGRA (Latitude 27 10')	1889		E	269 Gr 72	U	2	−0 092	2 51 52 0	−0 32	−0 32	+1 48		52 84	2 51 31 7	−0 21 14	−22 1	
					1364 ,,	L	3	+0 212	3 3 4 9	+0 62	+0 38	−1 48	+0 05	4 47	3 2 36 6	−0 27 87	−23 4	
		Dec 1	*I P E*	,	Lalan (F) 2774	L	3	+0 270	3 59 38 3	+0 79	+0 51	+1 48	+0 33	41 41	3 59 11 8	−0 29 61		−25 2
				W	380 Gr 72	U	2	−0 154	3 20 54 2	−0 50	−0 47	+1 48		54 71	4 5 57 6	+45 2 89	−30 2	
					1512 ,,	L	4	+0 114	3 46 52 5	+0 32	+0 15	−1 48	+0 02	51 51	4 31 46 3	+44 54 79		
				E	269 Gr 72	U	3	−0 092	2 51 39 3	+0 13	−0 22	+1 49		40 70	2 51 31 7	−0 9 00	−78 2	
				,	1364 ,,	L	3	+0 212	3 3 10 9	−0 25	+0 26	−1 49	+0 05	9 47	3 2 36 7	−0 32 77	−73 3	
		,, 2	*I P W*		Groom 642	U	3	−0 298	3 30 41 5	+0 38	−0 55	+1 49	+0 19	43 01	3 30 47 6	+0 4 59	−69 1	−73 0
				,,	Lalan (F) 2774	L	3	+0 270	3 59 44 6	−0 32	+0 35	+1 49	+0 33	46 45	3 59 11 8	−0 34 65	−71 3	
				,,	1512 Gr 72	L	3	+0 114	4 32 12 1	−0 13	+0 11	−1 49	+0 49	11 08	4 31 46 3	−0 24 78		
				E	269 Gr 72	U	4	−0 093	2 51 33 8	+0 13	−0 23	+1 50		35 20	2 51 31 6	−0 3 60	−66 0	
				,	1364 ,,	L	3	+0 212	3 3 1 9	−0 25	+0 27	−1 50	+0 05	0 47	3 2 36 8	−0 23 67		
		,, 3	*I P W*	,,	Groom 642	U	3	−0 298	3 30 35 1	+0 38	−0 57	+1 50	+0 19	36 60	3 30 47 6	+0 11 00	−67 9	−67 1
				,	Lalan (F) 2774	L	3	+0 270	3 59 37 5	−0 32	+0 36	+1 50	+0 33	39 37	3 59 11 8	−0 27 57		
				W	380 Gr 72	U	3	−0 154	3 20 45 2	+0 20	−0 33	+1 50		46 57	4 5 57 6	+45 11 03	−67 3	
				,,	1512 ,,	L	5	+0 114	3 46 54 7	−0 13	+0 11	−1 50	+0 02	53 20	4 31 46 2	+44 53 00		
				E	269 Gr 72	U	3	−0 092	2 51 30 4	−0 32	−0 22	+1 55		31 41	2 51 31 6	+0 0 19	−37 0	
				,,	1364 ,,	L	3	+0 212	3 2 48 5	+0 62	+0 25	−1 55	+0 05	47 87	3 2 36 8	−0 11 07		
		,, 4	*I P E*	,,	Groom 642	U	3	−0 298	3 30 38 1	−0 94	−0 53	+1 43	+0 19	38 25	3 30 47 6	+0 9 35	−38 8	−38 9
				,,	Lalan (F) 2774	L	4	+0 270	3 59 21 6	+0 79	+0 34	+1 43	+0 33	24 49	3 59 11 8	−0 12 69		
				W	380 Gr 72	U	3	−0 154	3 20 49 4	−0 50	−0 31	+1 43		50 02	4 5 57 6	+45 7 58	−41 0	
				,,	1512 ,,	L	4	+0 114	3 46 50 6	+0 32	+0 10	−1 43	+0 02	49 61	4 31 46 2	+44 56 59		
				E	269 Gr 72	U	5	−0 092	2 51 23 6	−0 32	−0 22	+1 49		24 55	2 51 31 5	+0 6 95		
				,,	Groom 642	U	4	−0 298	3 30 33 0	−0 94	−0 53	+1 49	+0 19	33 21	3 30 47 6	+0 14 39	−32 3	
		,, 5	*I P E*	,,	Lalan (F) 2774	L	4	+0 270	3 59 13 6	+0 79	+0 34	+1 49	+0 33	16 55	3 59 11 8	−0 4 75	−33 7	−34 9
				W	380 Gr 72	U	3	−0 154	3 20 49 2	−0 50	−0 31	+1 49		49 88	4 5 57 6	+45 7 72	−38 7	
				,,	1512 ,,	L	4	+0 114	3 46 49 8	+0 32	+0 10	−1 49	+0 02	48 75	4 31 56 1	+44 57 35		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for				Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a	Adopted Value of Deviation Correction
										Collimation	Level	Pen Equation Q	Approximate Clock Rate					
AGRA (E) AND KARACHI (W)	AGRA (Latitude 27° 10′)	1889						s	h m s	s	s	s	s	s	h m s	m s	d	d
				E	269 Gr 72	U	3	−0 092	2 51 15 4	+0 13	−0 16	+1 49		16 86	2 51 31 5	+ 0 14 64	−42 2	
				”	1364 ”	L	3	+0 212	3 2 36 7	−0 25	+0 18	−1 49	+0 05	35 19	3 2 37 0	+ 0 1 81		
		Dec 6	*I P W*	,	Groom 642	U	3	−0 298	3 30 27 4	+0 38	−0 39	−1 49	+0 19	26 09	3 30 47 6	+ 0 21 51	−33 6	−40 2
				”	Lalan (F) 2774	L	3	+0 270	3 59 7 6	−0 32	+0 25	+1 49	+0 33	9 35	3 59 11 8	+ 0 2 45		
				W	380 Gr 72	U	3	−0 154	3 20 46 4	+0 20	−0 23	+1 49		47 86	4 5 57 6	+45 9 74	−44 8	
				,	1512 ”	L	4	+0 114	3 46 49 9	−0 13	+0 07	−1 49	+0 02	48 37	4 31 46 1	+44 57 73		
	KARACHI (Latitude 24° 51′)	1889																
				E	269 Gr 72	U	2	−0 095	3 35 44 6	−0 16	−0 09	+1 60		45 95	2 51 31 7	−44 14 25	−101 1	
					1364 ”	L	3	+0 215	3 47 23 3	+0 32	+0 10	−1 60	+0 06	22 18	3 2 36 6	−44 45 58		
		Dec 1	*I P W*	W	Groom 642	U	5	−0 305	3 27 19 6	−0 49	−0 22	+1 60		20 49	3 30 47 6	+ 3 27 11	− 97 4	−99 5
					Lalan (F) 2774	L	6	+0 275	3 56 39 0	+0 41	+0 13	+1 60	+0 02	41 16	3 59 11 8	+ 2 30 64	− 99 9	
				”	1512 Gr 72	L	7	+0 115	4 29 2 5	+0 17	+0 04	−1 60	+0 04	1 15	4 31 46 3	+ 2 45 15		
				E	269 Gr 72	U	2	−0 095	3 35 47 0	−0 16	−0 09	+1 59		48 34	2 51 31 7	−44 16 64	− 5 9	
				,	1364 ,	L	5	+0 215	3 46 56 3	+0 32	+0 10	−1 59	+0 05	55 18	3 2 36 7	−44 18 48		
		” 2	*I P W*	W	Groom 642	U	5	−0 305	3 29 47 6	−0 49	−0 22	+1 59		48 48	3 30 47 6	+ 0 59 12	− 1 8	− 4 4
					Lalan (F) 2774	L	5	+0 275	3 58 11 6	+0 41	+0 13	+1 59	+0 02	13 75	3 59 11 8	+ 0 58 05	− 5 4	
				,	1512 Gr 72	L	6	+0 115	4 30 50 8	+0 17	+0 04	−1 59	+0 04	49 46	4 31 46 3	+ 0 56 84		
				E	269 Gr 72	U	3	−0 095	3 35 40 2	−0 02	0 00	+1 61		41 79	2 51 31 6	−44 10 19	− 3 5	
					1364	L	4	+0 215	3 46 49 6	+0 05	0 00	−1 61	+0 05	48 09	3 2 36 8	−44 11 29		
		” 3	*I P E*	W	Groom 642	U	4	−0 305	3 29 47 5	−0 07	0 00	+1 61		49 04	3 30 47 6	+ 0 58 56	+ 1 6	− 0 6
				”	Lalan (F) 2774	L	4	+0 275	3 58 10 6	+0 06	0 00	+1 61	+0 02	12 29	3 59 11 8	+ 0 59 51	0 0	
					1512 Gr 72	L	6	+0 115	4 30 49 2	+0 02	0 00	−1 61	+0 04	47 65	4 31 46 2	+ 0 58 55		
				E	269 Gr 72	U	3	−0 095	3 35 32 2	−0 02	−0 17	+1 60		33 61	2 51 31 6	−44 2 01	− 18 0	
				”	1364 ,	L	4	+0 215	3 46 45 7	+0 05	+0 18	−1 60	+0 05	44 38	3 2 36 8	−44 7 58		
		” 4	*I P E*	W	Groom 642	U	6	−0 305	3 29 41 2	−0 07	−0 40	+1 60		42 33	3 30 47 6	+ 1 5 27	− 15 1	−17 5
				”	Lalan (F) 2774	L	5	+0 275	3 58 13 4	+0 06	+0 24	+1 60	+0 02	15 32	3 59 11 8	+ 0 56 48	− 19 3	
				,	1512 Gr 72	L	6	+0 115	4 30 50 5	+0 02	+0 07	−1 60	+0 04	49 03	4 31 46 2	+ 0 57 17		
				E	269 Gr 72	U	3	−0 095	3 35 25 8	−0 02	−0 29	+1 59		27 08	2 51 31 5	−43 55 58	− 15 6	
				,	1364 ”	L	4	+0 215	3 46 38 5	+0 05	+0 32	−1 59	+0 05	37 33	3 2 36 9	−44 0 43		
		” 5	*I P E*	W	Groom 642	U	6	−0 305	3 29 41 1	−0 07	−0 70	+1 59		41 92	3 30 47 6	+ 1 5 68	− 15 0	−15 6
				”	Lalan (F) 2774	L	5	+0 275	3 58 12 7	+0 06	+0 43	+1 59	+0 02	14 80	3 59 11 8	+ 0 57 00	− 16 1	
				”	1512 Gr 72	L	7	+0 115	4 30 48 6	+0 02	+0 12	−1 59	+0 04	47 19	4 31 46 1	+ 0 58 91		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No. of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a	Adopted Value of Deviation Correction
									h m s	s	s	s	s	s	h m s	m s	d	d
AGRA (E) AND KARACHI (W)	KARACHI (Latitude 24 51')	1889		E	269 Gr 72	U	4	−0 095	3 35 19 3	−0 16	−0 17	+1 59		20 56	2 51 31 5	−43 49 06	−15 8	
				,	1864 ,,	L	5	+0 215	3 46 32 0	+0 32	+0 19	−1 59	+0 05	30 97	3 2 37 0	−43 53 97		
		Dec 6	*I P W*	W	Groom 642	U	5	−0 305	3 29 41 7	−0 49	−0 42	+1 59		42 38	3 30 47 6	+ 1 5 22	− 8 1	−11 9
				,	Lalan (F) 2774	L	5	+0 275	3 58 9 0	+0 41	+0 26	+1 59	+0 02	11 28	3 59 11 8	+ 1 0 52	− 11 9	
				,,	1512 Gr 72	L	6	+0 115	4 30 47 2	+0 17	+0 07	−1 59	+0 04	45 89	4 31 46 1	+ 1 0 21		
AGRA (E) AND KALIANPUR (W)	AGRA (Latitude 27 10')	1889		E	Radcliffe 1311	U	3	−0 262	4 52 53 9	−0 95	−0 59	+1 55		53 91	4 53 0 9	+ 0 6 99	−21 7	−27 6
		Dec 28	*I P E*		ε Ursæ Minoris	L	3	+0 156	4 57 7 9	+0 51	+0 20	+1 55	0 00	10 16	4 57 8 1	− 0 2 06		
				W	Groom 1004	U	3	−0 342	6 1 51 0	−1 23	−0 74	+1 55		50 58	6 3 57 2	+ 2 6 62	−33 4	
					δ Ursæ Minoris	L	2	+0 346	6 5 44 5	+1 17	+0 56	+1 55	0 00	47 78	6 7 31 4	+ 1 43 62		
				E	Radcliffe 1311	U	3	−0 262	4 52 50 9	+0 46	−0 27	+1 51		52 60	4 53 0 9	+ 0 8 30	−22 4	−26 7
				,	ε Ursæ Minoris	L	4	+0 156	4 57 7 9	−0 25	+0 09	+1 51	0 00	9 25	4 57 8 2	− 0 1 05		
		,, 29	*I P W*	W	Groom 1004	U	2	−0 342	6 1 49 9	+0 59	−0 34	+1 51		51 66	6 3 57 2	+ 2 5 54	−31 0	
					δ Ursæ Minoris	L	3	+0 346	6 5 46 0	−0 57	+0 26	+1 51	0 00	47 20	6 7 31 4	+ 1 44 20		
				E	Radcliffe 1311	U	3	−0 262	4 52 58 0	+0 46	−0 72	+1 50		59 24	4 53 0 9	+ 0 1 66	+ 4 9	− 1 8
					ε Ursæ Minoris	L	4	+0 156	4 57 3 0	−0 25	+0 25	+1 50	0 00	4 50	4 57 8 2	+ 0 3 70		
		,, 30	*I P W*	W	Groom 1004	U	2	−0 342	6 1 57 0	+0 59	−0 90	+1 50		58 19	6 3 57 2	+ 1 59 01	− 8 5	
					δ Ursæ Minoris	L	3	+0 346	6 5 36 6	−0 57	+0 68	+1 50	0 00	38 21	6 7 31 4	+ 1 53 19		
				E	Radcliffe 1311	U	3	−0 262	4 52 55 0	+0 46	+0 05	+1 49		57 00	4 53 0 9	+ 0 3 90	− 1 2	− 6 5
					ε Ursæ Minoris	L	4	+0 156	4 57 3 7	−0 25	−0 02	+1 49	0 00	4 92	4 57 8 3	+ 0 3 38		
		, 31	*I P W*	W	Groom 1004	U	2	−0 342	6 1 53 2	+0 59	+0 06	+1 49		55 34	6 3 57 2	+ 2 1 86	−11 8	
				,	δ Ursæ Minoris	L	3	+0 346	6 5 36 8	−0 57	−0 05	+1 49	0 00	37 67	6 7 31 4	+ 1 53 73		
		1890		E	Radcliffe 1311	U	3	−0 262	4 52 53 8	−0 95	−0 54	+1 48		53 79	4 53 0 9	+ 0 7 11	−13 9	−19 0
		Jan 1	*I P E*		ε Ursæ Minoris	L	3	+0 156	4 57 4 8	+0 51	+0 19	+1 48	0 00	6 98	4 57 8 3	+ 0 1 32		
				W	Groom 1004	U	2	−0 342	6 1 51 0	−1 23	−0 68	+1 48		50 57	6 3 57 2	+ 2 6 63	−24 1	
				,,	δ Ursæ Minoris	L	3	+0 346	6 5 38 2	+1 17	+0 52	+1 48	0 00	41 37	6 7 31 4	+ 1 50 03		
				E	Radcliffe 1811	U	3	−0 262	4 52 56 1	−0 95	−0 62	+1 47		56 00	4 53 0 9	+ 0 4 90	− 4 5	− 7 3
		, 2	*I P E*	,,	ε Ursæ Minoris	L	5	+0 156	4 57 3 2	+0 51	+0 21	+1 47	0 00	5 39	4 57 8 4	+ 0 3 01		
				W	Groom. 1004	U	1	−0 342	6 1 54 3	−1 23	−0 78	+1 47		53 76	6 3 57 2	+ 2 3 44	−10 1	
					δ Ursæ Minoris	L	2	+0 346	6 5 31 7	+1 17	+0 59	+1 47	0 00	34 93	6 7 31 4	+ 1 56 47		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction δ	Adopted Value of Deviation Correction
									h m s	s	s	s	s	s	h m s	m s	d	d
AGRA (E) AND KALIAVPUR (W)	KALIANPUR (Latitude 24° 7′)	1889		W	Radcliffe 1311	U	5	−0 270	4 52 35 0	+0 58	+0 32	+1 71		37 61	4 53 0 9	+ 0 23 29	0 0	
		Dec 28	I P W	״	ε Ursæ Minoris	L	6	+0 158	4 56 43 8	−0 31	−0 18	+1 71	0 00	44 80	4 57 8 1	+ 0 23 30		− 4 1
				״	Groom. 1004	U	4	−0 352	6 3 24 7	+0 75	+0 40	+1 71		27 56	6 3 57 2	+ 0 29 64	− 8 1	
				״	δ Ursæ Minoris	L	2	+0 353	6 7 6 8	−0 72	−0 29	+1 71	0 00	7 50	6 7 31 4	+ 0 23 90		
				W	Radcliffe 1811	U	8	−0 270	4 52 35 4	+0 58	+0 48	+1 58		38 04	4 53 0 9	+ 0 22 86	+ 3 6	
		״ 29	I P W	״	ε Ursæ Minoris	L	5	+0 158	4 56 42 7	−0 31	−0 15	+1 58	0 00	43 82	4 57 8 2	+ 0 24 38		− 1 6
				״	Groom 1004	U	3	−0 352	6 3 24 0	+0 75	+0 60	+1 58		26 93	6 3 57 2	+ 0 30 27	− 6 9	
				״	δ Ursæ Minoris	L	3	+0 353	6 7 5 6	−0 72	−0 44	+1 58	0 00	6 02	6 7 31 4	+ 0 25 38		
				W	Radcliffe 1311	U	5	−0 270	4 52 23 6	−1 07	−0 44	+1 56		23 65	4 53 0 9	+ 0 37 25	−45 9	
		״ 30	I P E	״	ε Ursæ Minoris	L	5	+0 158	4 56 48 3	+0 58	+0 14	+1 56	0 00	50 58	4 57 8 2	+ 0 17 62		−50 3
				״	Groom 1004	U	3	−0 352	6 3 9 5	−1 39	−0 55	+1 56		9 12	6 3 57 2	+ 0 48 08	−54 6	
				״	δ Ursæ Minoris	L	3	+0 353	6 7 18 5	+1 33	+0 40	+1 56	0 0	21 79	6 7 31 4	+ 0 9 61		
				W	Radcliffe 1311	U	5	−0 270	4 52 23 9	−1 07	−0 47	+1 57		23 93	4 53 0 9	+ 0 36 97	−39 4	
		31	I P E	״	ε Ursæ Minoris	L	5	+0 158	4 56 45 9	+0 58	+0 15	+1 57	0 00	48 20	4 57 8 3	+ 0 20 10		−44 2
				״	Groom 1004	U	3	−0 352	6 3 11 1	−1 39	−0 58	+1 57		10 70	6 3 57 2	+ 0 46 50	−49 1	
				״	δ Ursæ Minoris	L	2	+0 353	6 7 16 2	+1 33	+0 43	+1 57	0 00	19 53	6 7 31 4	+ 0 11 87		
		1890		W	Radcliffe 1811	U	5	−0 270	4 52 23 7	−1 07	−0 45	+1 59		23 77	4 53 0 9	+ 0 37 13	−36 5	
		Jan 1	I P E	״	ε Ursæ Minoris	L	5	+0 158	4 56 44 5	+0 58	+0 14	+1 59	0 00	46 81	4 57 8 3	+ 0 21 49		−40 9
				״	Groom 1004	U	3	−0 352	6 3 11 0	−1 39	−0 56	+1 59		10 64	6 3 57 2	+ 0 46 56	−45 2	
				״	δ Ursæ Minoris	L	3	+0 353	6 7 13 4	+1 33	+0 42	+1 59	0 00	16 74	6 7 31 4	+ 0 14 66		
				W	Radcliffe 1311	U	5	−0 270	4 52 22 6	+0 58	+0 26	+1 60		25 04	4 53 0 9	+ 0 35 86	−24 9	
		״ 2	I P W	״	ε Ursæ Minoris	L	5	+0 158	4 56 42 0	−0 31	−0 08	+1 60	0 00	43 21	4 57 8 4	+ 0 25 19		−29 0
				״	Groom 1004	U	3	−0 352	6 3 9 4	+0 75	+0 33	+1 60		12 08	6 3 57 2	+ 0 45 12	−33 1	
					δ Ursæ Minoris	L	3	+0 353	6 7 9 0	−0 72	−0 24	+1 60	0 00	9 64	6 7 31 4	+ 0 21 76		
KALIANPUR (E) AND BOMBAY (W)	KALIANPUR (Latitude 24 7′)	1890		E	51 Cephei	U	4	−0 411	6 48 57 6	−0 83	−0 12	+1 60		58 25	6 49 4 9	+ 0 6 65	−36 3	
		Jan 15	I P W	״	Radcliffe 4208	L	3	+0 350	6 50 53 9	+0 67	+0 08	+1 60	0 00	56 25	6 50 35 3	− 0 20 95		−35 2
				W	λ Ursæ Minoris	L	2	+1 141	7 13 59 1	+2 23	+0 29	+1 60		63 22	7 32 38 6	+18 35 38	−34 1	
				״	Groom 1119	U	1	−1 117	7 27 46 7	−2 22	−0 31	+1 60	−0 02	45 75	7 47 38 2	+19 52 45		
				E	51 Cephei	U	3	−0 411	6 48 59 2	−0 83	−0 31	+1 70		59 76	6 49 4 9	+ 0 5 14	−29 3	
		״ 17	I P W	״	Radcliffe 4208	L	3	+0 350	6 50 49 9	+0 67	+0 20	+1 70	0 00	52 47	6 50 35 3	− 0 17 17		−28 9
				W	λ Ursæ Minoris	L	2	+1 141	7 13 54 6	+2 23	+0 73	+1 70		59 26	7 32 38 3	+18 39 04	−28 4	
				״	Groom 1119	U	1	−1 117	7 27 56 9	−2 22	−0 79	+1 70	−0 02	55 57	7 47 38 8	+19 43 23		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for: Collimation	Corrections for: Level	Corrections for: Pen Equation Q	Corrections for: Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a	Adopted value of Deviation Correction
KALIANPUR (E) AND BOMBAY (W)	KALIANPUR (Latitude 24 7)	1890							h m s	s	s	s	s	s	h m s	m s	d	d
				E	51 Cephei	U	3	−0 411	6 49 32 5	+0 09	+0 04	+1 70		34 33	6 49 4 9	− 0 29 43	+55 6	
		Jan. 18	I P E	”	Radcliffe 4208	L	2	+0 350	6 50 20 9	−0 07	−0 03	+1 70	0 00	22 50	6 50 35 4	+ 0 12 90		+58 2
				W	λ Ursæ Minoris	L	2	+1 141	7 12 18 1	−0 25	−0 10	+1 70		19 45	7 32 38 1	+20 18 65	+60 8	
				”	Groom 1119	U	3	−1 117	7 29 35 6	+0 25	+0 10	+1 70	−0 02	3, 63	7 47 39 1	+18 1 47		
				E	51 Cephei	U	3	−0 411	6 49 10 2	+0 09	+0 10	+1 70		12 09	6 49 4 9	− 0 7 19	+ 2 5	
		” 19	I P E	”	Radcliffe 4208	L	3	+0 350	6 50 39 2	−0 07	−0 07	+1 70	0 00	40 76	6 50 35 5	− 0 5 26		+ 4 6
				W	λ Ursæ Minoris	L	2	+1 141	7 13 20 7	−0 25	−0 24	+1 70		21 91	7 32 37 9	+19 15 99	+ 6 6	
					Groom 1119	U	2	−1 117	7 28 36 1	+0 25	+0 26	+1 70	−0 02	38 29	7 47 39 4	+19 1 11		
				E	51 Cephei	U	3	−0 411	6 49 10 2	+0 09	+0 23	+1 74		12 26	6 49 4 9	− 0 7 36	+ 5 2	
				”	Radcliffe 4208	L	3	+0 350	6 50 37 5	−0 0,	−0 15	+1 74	0 00	39 02	6 50 35 6	− 0 3 42		
		, 20	I P E	W	λ Ursæ Minoris	L	2	+1 141	7 13 17 2	−0 25	−0 53	+1 74		18 16	7 32 37 7	+19 19 54	+10 8	+ 8 0
					Groom 1119	U	2	−1 117	7 28 42 1	+0 25	+0 58	+1 ,4	−0 02	44 65	7 47 39 7	+18 55 05		
				E	51 Cephei	U	3	−0 411	6 49 28 0	−0 83	−0 42	+1 70		28 43	6 49 4 8	− 0 23 63	+45 5	
				,	Radcliffe 4208	L	3	+0 350	6 50 22 0	+0 67	+0 26	+1 70	0 00	24 63	6 50 35 6	+ 0 10 97		
		, 21	I P W	W	λ Ursæ Minoris	L	2	+1 141	7 12 32 9	+2 23	+0 97	+1 70		37 80	7 32 37 6	+19 59 80	+49 0	+47 3
				,	Groom 1119	U	3	−1 117	7 29 32 3	−2 22	−1 05	+1 70	−0 02	30 71	7 47 39 9	+18 9 19		
	BOMBAY (Latitude 18° 54′)	1890																
				E	51 Cephei	U	1	−0 428	7 8 31 5	+0 05	+0 22	0 00		31 77	6 49 4 9	−19 26 87	− 6 5	
		Jan 15	I P E	,	Radcliffe 4208	L	1	+0 361	7 10 7 5	−0 04	−0 13	0 00	0 00	7 33	6 50 35 3	−19 32 03		− 4 8
				W	λ Ursæ Minoris	L	2	+1 181	7 32 47 8	−0 12	−0 50	0 00		47 18	7 32 38 6	− 0 8 58	− 3 0	
				,	Groom 1119	U	2	−1 160	7 47 39 2	+0 12	+0 55	0 00	−0 02	39 85	7 47 38 2	− 0 1 65		
				W	51 Cephei	U	2	−0 428	6 49 7 0	−0 78	+0 22	+1 40		7 84	6 49 4 9	− 0 2 94	− 9 8	
		” 17	I P W	”	λ Ursæ Minoris	L	2	+1 181	7 32 54 0	+2 11	−0 50	+1 40	−0 06	56 95	7 32 38 3	− 0 18 65	− 7 7	− 8 7
				,	Groom 1119	U	2	−1 160	7 47 39 6	−2 10	+0 55	+1 40	−0 08	39 37	7 47 38 8	− 0 0 57		
				E	51 Cephei	U	2	−0 428	7 8 25 2	−0 78	+0 20	+1 40		26 02	6 49 4 9	−19 21 12	−13 1	
		” 18	I P W	”	Radcliffe 4208	L	2	+0 361	7 10 4 9	+0 64	−0 12	+1 40	0 00	6 82	6 50 35 4	−19 31 42		−14 6
				W	λ Ursæ Minoris	L	1	+1 181	7 33 2 1	+2 11	−0 46	+1 40		5 15	7 32 38 1	− 0 27 05	−16 0	
				,	Groom 1119	U	1	−1 160	7 47 29 0	−2 10	+0 51	+1 40	−0 02	28 79	7 47 39 1	+ 0 10 31		
				E	51 Cephei	U	2	−0 428	7 8 29 3	+0 05	−0 34	+1 44		30 45	6 49 4 9	−19 25 55	− 2 6	
		, 19	I P E	”	Radcliffe 4208	L	3	+0 361	7 10 1 5	−0 04	+0 20	+1 44	0 00	3 10	6 50 35 5	−19 27 60		0 0
				W	λ Ursæ Minoris	L	1	+1 181	7 32 47 7	−0 12	+0 76	+1 44		49 78	7 32 37 9	− 0 11 88	+ 2 5	
				”	Groom 1119	U	1	−1 160	7 47 56 4	+0 12	−0 84	+1 44	−0 02	57 10	7 47 39 4	− 0 17 70		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No. of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction *a*	Adopted Value of Deviation Correction
		1890							h m s	s	s	s	s	s	h m s	m s	d	d
KALIANPUR (E) AND BOMBAY (W)	BOMBAY (Latitude 18° 54′)			E	51 Cephei	U	2	−0 428	7 8 26 3	+0 05	−0 26	+1 41		27 50	6 49 4 9	−19 22 60	− 8 1	
		Jan 20	*I P E*	,,	Radcliffe 4208	L	2	+0 361	7 10 3 1	−0 04	+0 15	+1 41	0 00	4 62	6 50 35 6	−19 29 02		− 5 7
				W	λ Ursæ Minoris	L	1	+1 181	7 32 54 9	−0 12	+0 57	+1 41		56 76	7 32 37 7	− 0 19 06	− 3 2	
				,,	Groom 1119	U	1	−1 160	7 47 50 3	+0 12	−0 63	+1 41	−0 02	51 18	7 47 39 7	− 0 11 48		
				E	51 Cephei	U	3	−0 428	7 8 25 0	−0 78	+0 19	+1 41		25 82	6 49 4 8	−19 21 02	− 9 7	
					Radcliffe 4208	L	2	+0 361	7 10 2 3	+0 64	−0 11	+1 41	0 00	4 24	6 50 35 6	−19 28 64		
		,, 21	*I P W*	W	λ Ursæ Minoris	L	2	+1 181	7 33 2 8	+2 11	−0 42	+1 41		5 90	7 32 37 6	− 0 28 30	− 9 5	− 9 5
				,,	Groom 1119	U	1	−1 160	7 47 46 4	−2 10	+0 46	+1 41	−0 02	46 15	7 47 39 9	− 0 6 25		
		1890																
JUBBULPORE (E) AND KALIANPUR (W)	JUBBULPORE (Latitude 23 10′)			E	λ Ursæ Minoris	L	2	+1 147	7 32 0 2	+5 45	−2 38	+1 80		5 07	7 32 40 1	+ 0 35 03	+ 7 4	
		Feb 4	*I P E*	,,	Groom 1119	U	2	−1 127	7 47 21 8	−5 44	+2 59	+1 80	+0 01	20 76	7 47 38 9	+ 0 18 14		+10 5
				W	Piazzi IX 37	U	4	−0 134	9 11 48 1	−0 69	+0 42	−1 80		46 03	9 21 27 5	+ 9 41 47	+13 6	
				,,	Groom 3548	L	3	+0 354	9 11 22 5	+1 65	−0 65	−1 80	0 00	21 0	9 21 9 8	+ 9 48 10		
				E	λ Ursæ Minoris	L	2	+1 147	7 32 5 5	−3 47	−1 45	+1 78		2 36	7 32 40 5	+ 0 38 14	+ 9 9	
		,, 5	*I P W*	,,	Groom 1119	U	2	−1 127	7 47 16 2	+3 46	+1 57	+1 78	+0 01	23 02	7 47 38 7	+ 0 15 68		+10 1
				W	Piazzi IX 37	U	4	−0 134	9 11 44 7	+0 44	+0 25	−1 78		43 61	9 21 27 5	+ 9 43 89	+10 3	
				,,	Groom 3548	L	2	+0 354	9 11 24 0	−1 05	−0 39	−1 78	0 00	20 78	9 21 9 7	+ 9 48 92		
				E	λ Ursæ Minoris	L	2	+1 147	7 32 8 4	−3 47	−0 89	+1 79		5 83	7 32 40 9	+ 0 35 07	+ 8 7	
		,, 6	*I P W*	,,	Groom 1119	U	2	−1 127	7 47 16 9	+3 46	+0 96	+1 79	+0 01	23 12	7 47 38 4	+ 0 15 28		+ 6 7
				W	Piazzi IX 37	U	4	−0 134	9 11 42 7	+0 44	+0 16	−1 79		41 51	9 21 27 5	+ 9 45 99	+ 4 7	
				,,	Groom 3548	L	2	+0 354	9 11 24 4	−1 05	−0 24	−1 79	0 00	21 32	9 21 9 6	+ 9 48 28		
				E	λ Ursæ Minoris	L	1	+1 147	7 31 38 3	+5 45	−0 75	+1 75		44 75	7 32 41 4	+ 0 56 65	+23 0	
		,, 7	*I P E*	,,	Groom 1119	U	1	−1 127	7 47 36 5	−5 44	+0 81	+1 75	+0 01	33 63	7 47 38 0	+ 0 4 37		+23 4
				W	Piazzi IX 37	U	4	−0 134	9 11 45 4	−0 69	+0 13	−1 75		43 09	9 21 27 6	+ 9 44 51	+23 8	
				,,	Groom 3548	L	2	+0 354	9 11 13 8	+1 65	−0 20	−1 75	0 00	13 50	9 21 9 6	+ 9 56 10		
				E	λ Ursæ Minoris	L	2	+1 147	7 31 27 8	+5 45	−2 48	+1 74		32 51	7 32 41 9	+ 1 9 39	+35 7	
		8	*I P E*	,,	Groom 1119	U	1	−1 127	7 47 50 3	−5 44	+2 69	+1 74	+0 01	49 30	7 47 37 5	− 0 11 80		+35 1
				W	Piazzi IX 37	U	5	−0 134	9 11 45 8	−0 69	+0 43	−1 74		43 80	9 21 27 6	+ 9 43 80	+34 5	
				,,	Groom 3548	L	2	+0 354	9 11 9 7	+1 65	−0 67	−1 74	0 00	8 94	9 21 9 6	+10 0 66		
				E	λ Ursæ Minoris	L	2	+1 147	7 31 23 8	−3 47	+0 47	+1 75		22 55	7 32 42 5	+ 1 19 95	+41 6	
		,, 9	*I P W*	,,	Groom 1119	U	2	−1 127	7 47 46 9	+3 46	−0 51	+1 75	+0 01	51 61	7 47 37 0	− 0 14 61		+42 6
				W	Piazzi IX 37	U	4	−0 134	9 11 45 1	+0 44	−0 08	−1 71		43 75	9 21 27 6	+ 9 43 85	+43 6	
				,,	Groom 3548	L	2	+0 354	9 11 7 1	−1 05	+0 13	−1 71	0 00	4 47	9 21 9 6	+10 5 13		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pendulum Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction *a*	Adopted Value of Deviation Correction
		1890							h m s	s	s	s	s	s	h m s	m s	d	d
JUBBULPORE (E) AND KALIANPUR (W)	KALIANPUR (Latitude 24 7)			W	λ Ursæ Minoris	L	3	+1 140	7 32 11 7	−1 86	+1 51	+1 68		13 03	7 32 40 1	+ 0 27 07	− 4 3	
		Feb 4	I P W	„	Groom 1119	U	3	−1 119	7 47 0 1	+1 85	−1 63	+1 68	+0 01	2 01	7 47 38 9	+ 0 36 89		− 3 3
				,	Piazzi IX 37	U	7	−0 133	9 20 56 2	+0 24	−0 26	−1 68		54 50	9 21 27 5	+ 0 33 00	− 2 2	
					Groom 3548	L	3	+0 352	9 20 39 7	−0 56	+0 41	−1 68	0 00	37 87	9 21 9 8	+ 0 31 93		
				W	λ Ursæ Minoris	L	3	+1 140	7 33 8 8	−1 86	+0 73	+1 65		9 32	7 32 40 5	− 0 28 82	−54 1	
		„ 5	I P W	,	Groom 1119	U	3	−1 119	7 46 2 7	+1 85	−0 79	+1 65	+0 01	5 42	7 47 38 7	+ 1 33 28		−53 4
					Piazzi IX 37	U	5	−0 133	9 20 47 7	+0 24	−0 13	−1 65		46 16	9 21 27 5	+ 0 41 34	−52 6	
				„	Groom 3548	L	3	+0 352	9 20 55 9	−0 56	+0 20	−1 65	0 00	53 89	9 21 9 7	+ 0 15 81		
				W	λ Ursæ Minoris	L	3	+1 140	7 31 59 8	+3 84	+1 51	+1 69		66 84	7 32 40 9	+ 0 34 06	− 1 0	
		„ 6	I P E	„	Groom 1119	U	3	−1 119	7 47 5 9	−3 83	−1 63	+1 69	+0 01	2 14	7 47 38 4	+ 0 36 26		− 0 5
				,	Piazzi IX 37	U	5	−0 133	9 20 53 9	−0 49	−0 26	−1 69		51 46	9 21 27 5	+ 0 36 04	0 0	
				„	Groom 3548	L	4	+0 352	9 20 33 7	+1 16	+0 41	−1 69	0 00	33 58	9 21 9 6	+ 0 36 02		
				W	λ Ursæ Minoris	L	4	+1 140	7 31 59 2	+3 84	−0 15	+1 68		64 57	7 32 41 4	+ 0 36 83	+ 0 2	
		„ 7	I P E	,	Groom 1119	U	3	−1 119	7 47 3 5	−3 83	+0 16	+1 68	+0 01	1 52	7 47 38 0	+ 0 36 48		+ 1 7
					Piazzi IX 37	U	6	−0 133	9 20 52 6	−0 49	+0 03	−1 68		50 46	9 21 27 6	+ 0 37 14	+ 3 3	
				„	Groom 3548	L	3	+0 352	9 20 31 4	+1 16	−0 04	−1 68	0 00	30 84	9 21 9 6	+ 0 38 76		
				W	λ Ursæ Minoris	L	4	+1 140	7 31 50 9	+3 84	−0 39	+1 70		56 05	7 32 41 9	+ 0 45 85	+ 7 3	
		„ 8	I P E	„	Groom 1119	U	3	−1 119	7 47 9 9	−3 83	+0 42	+1 70	+0 01	8 20	7 47 37 5	+ 0 29 30		+ 7 8
				„	Piazzi IX 37	U	5	−0 133	9 20 52 6	−0 49	+0 07	−1 70		50 48	9 21 27 6	+ 0 37 12	+ 8 3	
				,	Groom 3548	L	4	+0 352	9 20 29 1	+1 16	−0 11	−1 70	0 00	28 45	9 21 9 6	+ 0 41 15		
				W	λ Ursæ Minoris	L	4	+1 140	7 32 6 8	−1 86	+0 29	+1 68		6 91	7 32 42 5	+ 0 35 59	− 1 4	
		„ 9	I P W	,	Groom 1119	U	4	−1 119	7 46 55 1	+1 85	−0 32	+1 68	+0 01	58 32	7 47 37 0	+ 0 38 68		− 1 1
				,	Piazzi IX 37	U	5	−0 133	9 20 49 8	+0 24	−0 05	−1 68		48 31	9 21 27 6	+ 0 39 29	− 0 7	
				„	Groom 3548	L	4	+0 352	9 20 32 8	−0 56	+0 08	−1 68	0 00	30 64	9 21 9 6	+ 0 38 96		
MOOLTAN (E) AND QUETTA (W)	MOOLTAN (Latitude 30° 11′)	1890		E	Bradley 2935	L	3	+0 155	10 2 10 9	+0 72	+0 13	+1 61		13 36	10 2 1 2	− 0 12 16		
				„	Groom 3709	L	3	+0 155	10 2 17 7	+0 72	+0 13	+1 61		20 16	10 2 8 2	− 0 11 96	−18 2 −17 6	
		Mar 24	I P E	„	Bradley 1399	U	3	−0 202	10 13 51 4	−1 07	−0 30	+1 61	−0 06	51 58	10 13 45 9	− 0 5 68		−17 8
				„	„ 3147	L	2	+0 347	11 27 40 7	+1 67	+0 37	+1 61		44 35	11 27 27 7	− 0 16 65	−17 5	
				„	Groom 1845	U	4	−0 118	11 54 53 4	−0 65	−0 20	−1 61	−0 15	50 79	11 54 42 3	− 0 8 49		
				E	Bradley 1399	U	3	−0 202	10 14 16 5	+0 67	−0 45	0 00		16 72	10 13 45 9	− 0 30 82	−23 6	
		„ 27	I P W	„	„ 3038	L	3	+0 160	10 48 22 9	−0 47	+0 21	+1 61	−0 19	24 06	10 47 44 7	− 0 39 36		−25 2
				„	„ 3147	L	2	+0 347	11 28 11 4	−2 05	+0 55	+1 61		12 51	11 27 28 0	− 0 44 51	−26 8	
					Groom 1845	U	3	−0 118	11 55 16 0	+0 41	−0 29	−1 61	−0 15	14 36	11 54 42 3	− 0 32 06		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a	Adopted Value of Deviation Correction
MOOLTAN (E) AND QUETTA (W)	MOOLTAN (Latitude 30° 11′)	1890							h m s	s	s	s	s	s	h m s	m s	d	d
				E	Bradley 2935	L	3	+0 155	10 2 46 8	−0 45	+0 17	+1 61		48 13	10 2 1 6	−0 46 53		
				„	Groom 3709	L	3	+0 155	10 2 53 1	−0 45	+0 17	+1 61		54 43	10 2 8 6	−0 45 83	−23 5 −21 6	
		Mar 28	*I P W*	„	Bradley 1399	U	3	−0 202	10 14 22 2	+0 67	−0 39	+1 61	−0 06	24 03	10 13 45 9	−0 38 13		−25 4
				„	„ 3147	L	3	+0 347	11 28 22 0	−1 05	+0 48	+1 61		23 04	11 27 28 1	−0 54 94	−31 1	
				„	Groom 1845	U	4	−0 118	11 55 24 4	+0 41	−0 26	−1 61	−0 15	22 79	11 54 42 3	−0 40 49		
				E	Bradley 2935	L	4	+0 155	10 3 3 1	+0 72	+0 19	+1 61		5 62	10 2 1 8	−1 3 82		
				,	Groom 3709	L	4	+0 155	10 3 9 6	+0 72	+0 19	+1 61		12 12	10 2 8 9	−1 3 22	−30 4 −28 8	
		„ 30	*I P E*	,	Bradley 1399	U	2	−0 202	10 14 38 8	−1 07	−0 43	+1 61	−0 06	38 85	10 13 45 9	−0 52 95		−29 1
					„ 3147	L	2	+0 347	11 28 33 7	+1 67	+0 53	+1 61		37 51	11 27 28 3	−1 9 21	−28 2	
				„	Groom 1845	U	3	−0 118	11 55 41 0	−0 65	−0 29	−1 61	−0 15	38 30	11 54 42 2	−0 56 10		
				E	Bradley 2935	L	3	+0 155	10 3 11 8	+0 72	+0 20	+1 61		14 33	10 2 1 9	−1 12 43		
				„	Groom 3709	L	3	+0 155	10 3 18 0	+0 72	+0 20	+1 61		20 53	10 2 8 9	−1 11 63	−37 0 −34 7	
		„ 31	*I P E*	,	Bradley 1399	U	2	−0 202	10 14 45 1	−1 07	−0 45	+1 61	−0 06	45 13	10 13 45 9	−0 59 23		−34 0
				„	3147	L	2	+0 347	11 28 43 2	+1 67	+0 55	+1 61		47 03	11 27 28 3	−1 18 73	−30 2	
				,	Groom 1845	U	2	−0 118	11 55 49 6	−0 65	−0 29	−1 61	−0 15	46 90	11 54 42 2	−1 4 70		
	QUETTA (Latitude 30° 12′)	1890																
				E	Bradley 2935	L	4	+0 155	10 20 2 9	−1 04	−0 38	+1 77		3 25	10 2 1 2	−18 2 05		
					Groom 3709	L	4	+0 155	10 20 9 4	−1 04	−0 38	+1 77		9 75	10 2 8 2	−18 1 55	−55 3 −53 9	
		Mar 24	*I P E*		Bradley 1399	U	1	−0 202	10 31 24 1	+1 54	+0 86	+1 77	−0 06	28 21	10 13 45 9	−17 42 31		−53 6
				,	, 3147	L	5	+0 347	11 45 45 1	−2 41	−1 06	−1 77		39 86	11 27 27 7	−18 12 16	−51 5	
				,	Groom 1845	U	6	−0 118	12 12 30 9	+0 94	+0 57	−1 77	−0 15	30 49	11 54 42 3	−17 48 19		
				W	Bradley 3147	L	6	+0 347	11 27 51 4	−2 41	−0 77	−1 78		46 44	11 27 28 0	− 0 18 44	−33 6	
		, 27	*I P E*	,	Groom 2006	U	3	−0 618	13 6 26 7	+4 52	+1 70	−1 78	−0 48	30 66	13 6 44 6	+ 0 13 94		−33 8
				„	Polaris	L	3	+0 879	13 18 16 7	−6 22	−2 14	−1 78	−0 54	6 02	13 17 29 2	− 0 36 82	−33 9	
				E	Bradley 2935	L	5	+0 155	10 20 30 6	+1 31	+0 17	+1 74		33 82	10 2 1 6	−18 32 22		
				„	Groom 3709	L	5	+0 155	10 20 37 1	+1 31	+0 17	+1 74		40 32	10 2 8 6	−18 31 72	−36 3 −34 9	
		„ 28	*I P W*		Bradley 1399	U	5	−0 202	10 32 5 8	−1 93	−0 39	+1 74	−0 06	5 16	10 13 45 9	−18 19 26		−34 8
				„	„ 3147	L	5	+0 347	11 46 5 4	+3 03	+0 48	−1 74		7 17	11 27 28 1	−18 39 07	−33 1	
				,	Groom 1845	U	6	−0 118	12 13 9 3	−1 18	−0 26	−1 74	−0 15	5 97	11 54 42 3	−18 23 67		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction *a*	Adopted Value of Deviation Correction
MOOLTAN (E) AND QUETTA (W)	QUETTA (Latitude 30 12)	1890							h m s	s	s	s	s	s	h m s	m s	d	d
				E	Bradley 2935	L	5	+0 155	10 20 45 5	+1 31	+0 27	+1 91		48 99	10 2 1 8	−18 47 19		
					Groom. 3709	L	5	+0 155	10 20 52 2	+1 31	+0 27	+1 91		55 69	10 2 8 9	−18 46 79	− 29 0	
		Mar 30	I P W	„	Bradley 1899	U	4	−0 202	10 32 23 4	−1 91	−0 60	+1 91	−0 06	22 72	10 13 45 9	−18 36 82	− 27 9	−28 1
				,	„ 3147	L	5	+0 347	11 46 19 6	+3 03	+0 74	−1 91		21 46	11 27 28 3	−18 53 16	− 27 3	
				„	Groom 1845	U	6	−0 118	12 13 26 3	−1 18	−0 40	−1 91	−0 15	22 66	11 54 42 2	−18 40 46		
				E	Bradley 2935	L	5	+0 155	10 20 52 4	+1 31	+0 29	0 00		54 00	10 2 1 9	−18 52 10		
				,	Groom 3709	L	5	+0 155	10 20 58 9	+1 31	+0 29	0 00		60 50	10 2 8 9	−18 51 60	− 23 9	
		„ 31	I P W		Bradley 1399	U	3	−0 202	10 32 32 1	−1 93	−0 65	0 00	−0 06	29 46	10 13 45 9	−18 43 56	− 22 5	−23 1
				,	, 3147	L	5	+0 347	11 46 26 0	+3 03	+0 79	0 00		29 82	11 27 28 3	−19 1 52	− 22 8	
				„	Groom 1845	U	6	−0 118	12 13 34 9	−1 18	−0 43	0 00	−0 15	33 14	11 54 42 2	−18 50 94		
KARACHI (E) AND QUETTA (W)	KARACHI (Latitude 24 51)	1890																
				W	Bradley 3194	L	2	+0 307	11 55 56 6	+0 36	−0 05	+1 85		58 76	11 54 0 5	− 1 58 26	−107 0	
					1672	U	2	−0 677	12 15 17 5	−0 83	+0 13	−1 85	−0 09	14 86	12 15 1 9	− 0 12 96		
		Apr 7	I P E	E	48	L	3	+0 152	12 31 17 1	+0 17	−0 02	−1 85		15 40	12 31 19 9	+ 0 4 50	−110 0	−108 5
					Groom 1923	U	3	−0 192	12 37 12 8	−0 25	+0 05	−1 85	+0 02	10 77	12 37 53 1	+ 0 42 33		
		, 8	I P W															* −108 5
				W	Bradley 3194	L	2	+0 307	11 56 7 6	+0 16	+0 04	+1 80		9 60	11 54 0 5	− 2 9 10	−103 0	
		„ 9	I P W		1672	U	1	−0 677	12 15 31 5	−0 38	−0 10	−1 80	−0 09	29 13	12 15 1 4	− 0 27 73		−106 2
				E	, 48	L	3	+0 152	12 31 7 0	+0 08	+0 01	−1 80		5 29	12 31 20 0	+ 0 14 71	−109 3	
					Groom 1923	U	3	−0 192	12 37 2 6	−0 11	−0 03	−1 80	+0 02	0 68	12 37 53 0	+ 0 52 32		
				W	Bradley 3194	L	2	+0 307	11 56 16 5	+0 36	−0 34	+1 84		18 36	11 54 0 5	− 2 17 86	−106 7	
					1672	U	1	−0 6,,	12 15 35 8	−0 83	+0 98	−1 84	−0 09	34 02	12 15 1 2	− 0 32 82		
		„ 10	I P E	E	, 48	L	3	+0 152	12 31 2 8	+0 17	−0 13	−1 84		1 00	12 31 20 1	+ 0 19 10	−109 4	−108 0
					Groom 1923	U	3	−0 192	12 36 58 0	−0 25	+0 33	−1 84	+0 02	56 26	12 37 53 0	+ 0 56 74		
				W	Bradley 3194	L	2	+0 307	11 56 22 0	+0 36	−0 44	+1 85		23 17	11 54 0 5	− 2 23 37	−103 5	
		„ 11	I P E	,	, 1672	U	1	−0 677	12 15 43 9	−0 83	+1 28	−1 85	−0 09	42 41	12 15 1 0	− 0 41 41		−107 4
				E	, 48	L	3	+0 152	12 30 58 4	+0 17	−0 17	−1 85		56 55	12 31 20 1	+ 0 23 55	−111 3	
					Groom 1923	U	2	−0 192	12 36 52 7	−0 25	+0 43	−1 85	+0 02	51 05	12 37 52 9	+ 1 1 85		
				W	Bradley 3194	L	2	+0 307	11 56 29 7	+0 16	+0 05	+1 88		31 79	11 54 0 5	− 2 31 29	−107 2	
				,,	„ 1672	U	1	−0 677	12 15 49 1	−0 38	−0 13	−1 88	−0 09	46 62	12 15 0 8	− 0 45 82		−109 1
		, 12	I P W	E	, 48	L	3	+0 152	12 30 53 6	+0 68	+0 02	−1 88		51 82	12 31 20 2	+ 0 28 38	−110 9	
				„	Groom 1923	U	2	−0 192	12 36 48 4	−0 11	−0 05	−1 88	+0 02	46 38	12 37 52 9	+ 1 6 52		

* No star observations were taken for the determination of the deviation correction: it had therefore to be deduced from the readings of two collimators, which were found on April 9th to have remained immovable since April 7th.

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction *a*	Adopted Value of Deviation Correction
KARACHI (E) AND QUETTA (W)	QUETTA (Latitude 30 12')	1890							h m s	s	s	s	s	s	h m s	m s	d	d
				E	Bradley 3194	I	3	+0 295	11 53 44 8	−1 78	−0 69	+1 90		44 23	11 54 0 5	+ 0 16 27		
		Apr 7	*I P E*		„ 48	L	6	+0 147	12 31 4 6	−0 86	−0 28	−1 90	+0 13	1 69	12 31 19 9	+ 0 18 21	− 10 8	−10 3
				,	Groom 1923	U	6	−0 181	12 37 31 6	+1 21	+0 62	−1 90	+0 15	31 68	12 37 53 1	+ 0 21 42	− 9 8	
				W	Bradley 3194	L	2	+0 295	11 55 39 2	−1 78	−0 69	+1 93		38 66	11 54 0 5	− 1 38 16	− 11 8	
		„ 8	*I P E*		, 1672	U	2	−0 642	12 16 24 9	+4 08	+1 88	−1 93	−0 10	28 83	12 15 1 7	− 1 27 13		−12 2
				E	, 48	L	5	+0 147	12 30 60 2	−0 86	−0 28	−1 93		57 13	12 31 19 9	+ 0 22 77	− 12 5	
				,	Groom 1923	U	4	−0 181	12 37 26 3	+1 21	+0 62	−1 93	+0 02	26 22	12 37 53 1	+ 0 26 88		
				W	Bradley 3194	L	4	+0 295	11 55 50 2	+2 30	+0 92	+1 93		55 35	11 54 0 5	− 1 54 85	− 49 5	
		, 9	*I P W*	,	, 1672	U	2	−0 642	12 16 19 7	−5 29	−2 51	−1 93	−0 10	9 87	12 15 1 4	− 1 8 41		−53 3
				E	, 48	I	8	+0 147	12 30 59 3	+1 11	+0 38	−1 93		58 86	12 31 20 0	+ 0 21 14	− 57 2	
				,	Groom 1923	U	3	−0 181	12 37 17 4	−1 57	−0 83	−1 93	+0 02	13 09	12 37 53 0	+ 0 39 91		
				W	Bradley 3194	L	3	+0 295	11 55 56 8	+2 30	+0 89	+1 92		61 91	11 54 0 5	− 2 1 41	− 47 2	
		10	*I P W*		„ 1672	U	2	−0 642	12 16 28 1	−5 29	−2 43	−1 92	−0 10	18 36	12 15 1 2	− 1 17 16		−50 3
				E	„ 48	L	7	+0 147	12 30 54 2	+1 11	+0 37	−1 92		53 76	12 31 20 1	+ 0 26 34	− 53 4	
					Groom 1923	U	5	−0 181	12 37 13 4	−1 57	−0 80	−1 92	+0 02	9 13	12 37 53 0	+ 0 43 87		
				W	Bradley 3194	L	4	+0 295	11 56 7 9	−1 78	−0 72	+1 92		7 32	11 54 0 5	− 2 6 82	− 41 1	
		, 11	*I P E*	„	„ 1672	U	2	−0 642	12 16 25 3	+4 08	+1 96	−1 92	−0 10	29 32	12 15 1 0	− 1 28 32		−43 5
				E	„ 48	L	7	+0 147	12 30 51 3	−0 86	−0 29	−1 92		48 23	12 31 20 1	+ 0 31 87	− 46 0	
				,	Groom 1923	U	4	−0 181	12 37 6 0	+1 21	+0 64	−1 92	+0 02	5 95	12 37 52 9	+ 0 46 95		
				W	Bradley 3194	L	3	+0 295	11 56 4 6	−1 78	−0 03	+1 93		4 72	11 54 0 5	− 2 4 22	− 11 3	
		12	*I P E*	,	„ 1672	U	2	−0 642	12 16 52 3	+4 08	+0 08	−1 93	−0 10	54 43	12 15 0 8	− 1 53 63		−12 3
				E	„ 48	L	6	+0 147	12 30 41 6	−0 86	−0 01	−1 93		38 80	12 31 20 2	+ 0 41 40	− 13 3	
				,	Groom 1923	U	4	−0 181	12 37 7 8	+1 21	+0 03	−1 93	+0 02	7 13	12 37 52 9	+ 0 45 77		

Between Captain Burrard and Lieutenant Lenox-Conyngham

By Stars of	Observed with Telescope No 2.								
	At DEHRA DŪN (Latitude 30 19′)								
	October 16, 1889			October 17 1889			October 18 1889		
	Star	Declination	Equation B − C	Star	Declination	Equation B − C	Star	Declination	Equation B − C
		°	″			″		° ′	″
North Aspect	7948	+ 43 57	− 0 17	7879	+ 39 3	− 0 14	7721	+ 32 38	− 0 28
	7994	+ 41 1	− 15	7931	+ 38 53	− 28	7731	+ 32 38	− 31
	8023	+ 41 44	− 22	7948	+ 43 57	− 22	7753	+ 34 4	− 24
	8076	+ 42 57	− 20	7984	+ 39 47	− 24	7777	+ 37 12	− 22
	8110	+ 44 34	− 19	7994	+ 41 1	− 17	7820	+ 48 55	− 16
	8171	+ 42 18	− 14	8023	+ 41 44	− 20	7879	+ 39 3	− 28
	8195	+ 38 38	− 17	8037	+ 40 41	− 32	7948	+ 43 57	− 25
	8237	+ 43 43	− 23	8058	+ 45 48	− 17	7972	+ 42 43	− 26
	8261	+ 45 48	− 26	8076	+ 42 57	− 32	7984	+ 39 4	− 27
				8115	+ 44 53	− 25	8023	+ 41 44	− 22
				8136	+ 37 35	− 21	8076	+ 42 57	− 29
				8171	+ 42 18	− 25	8118	+ 41 10	− 32
				8195	+ 38 38	− 25	8195	+ 38 38	− 27
				8206	+ 30 43	− 36	8237	+ 43 43	− 27
				8223	+ 43 49	− 19	8261	+ 45 48	− 49
				8237	+ 43 43	− 35			
				8261	+ 45 48	− 28			
	Mean ($B_N - C_N$)		− 0 192			− 0 247			− 0 275
South Aspect	7958	+ 24 1	− 0 25	7833	+ 8 34	− 0 27	7798	+ 27 47	− 0 23
	7975	+ 16 14	− 21	7856	+ 19 40	− 25	7807	+ 20 18	− 20
	7988	+ 8 14	− 26	7893	+ 18 57	− 18	7856	+ 19 40	− 23
	8003	+ 11 9	− 13	7914	+ 28 44	− 29	7908	+ 10 15	− 36
	8052	+ 24 53	− 23	7975	+ 16 14	− 17	7923	+ 29 38	− 28
	8091	+ 27 28	− 17	8003	+ 11 9	− 23	7937	+ 18 47	− 16
	8131	+ 23 8	− 22	8091	+ 27 28	− 33	7958	+ 24 1	− 27
	8146	+ 20 14	− 18	8247	+ 18 3	− 12	8003	+ 11 9	− 28
	8160	+ 22 48	− 20	8296	+ 21 3	− 16	8032	+ 27 29	− 29
	8203	+ 21 54	− 25	8324	+ 24 32	− 25	8052	+ 24 53	− 29
	8222	+ 16 13	− 08	8337	+ 26 18	− 13	8091	+ 27 28	− 17
	8247	+ 18 3	− 05				8131	+ 23 8	− 27
	8272	+ 7 38	− 16				8147	+ 19 57	− 25
	8296	+ 21 3	− 30				8203	+ 21 54	− 32
	8324	+ 24 32	− 25				8222	+ 16 13	− 37
	8337	+ 26 18	− 20						
	8350	+ 26 30	− 02						
	Mean ($B_S - C_S$)		− 0 186			− 0 216			− 0 265

Between Captain Burrard and Lieutenant Lenox-Conyngham.

OBSERVED WITH TELESCOPE No 1

At AGRA (Latitude 27° 10′)

By Stars of	December 18, 1889			December 19 1889			December 20, 1889			December 21 1889		
	Star	Declination	Equation B − C	Star	Declination	Equation B − C	Star	Declination	Equation B − C	Star	Declination	Equation B − C
		° ′	s		° ′	s		° ′	s		°	s
North Aspect	821	+ 39 44	− 0 22	821	+ 39 44	− 0 35	821	+ 39 44	− 0 20	821	+ 39 44	− 0 28
	829	+ 43 50	− 25	861	+ 28 48	− 17	861	+ 28 48	− 08	829	+ 43 50	− 34
	861	+ 28 48	− 12	871	+ 37 52	− 20	871	+ 37 52	− 29	861	+ 28 48	− 16
	871	+ 37 52	− 22	888	+ 37 53	− 23	888	+ 37 53	− 21	871	+ 37 52	− 22
	888	+ 37 53	− 20	912	+ 39 13	− 28	912	+ 39 13	− 21	888	+ 37 53	− 25
	912	+ 39 13	− 18	932	+ 35 41	− 21	932	+ 35 41	− 32	912	+ 39 13	− 35
	932	+ 35 41	− 26	953	+ 38 25	− 23	953	+ 38 25	− 34	932	+ 35 41	− 21
	953	+ 38 25	− 23	963	+ 40 32	− 27	1008	+ 38 53	− 27	953	+ 38 25	− 21
	1008	+ 38 53	− 18	974	+ 28 40	− 21	1089	+ 47 35	− 20	1008	+ 38 53	− 19
	1089	+ 47 35	− 21	1008	+ 38 53	− 29	1097	+ 31 39	− 30	1089	+ 47 35	− 36
	1097	+ 31 39	− 26	1089	+ 47 35	− 28	1105	+ 42 13	− 21	1097	+ 31 39	− 28
	1105	+ 42 13	− 20	1097	+ 31 39	− 31	1123	+ 37 14	− 33	1123	+ 37 14	− 36
	1123	+ 37 14	− 28	1123	+ 37 14	− 30						
	Mean $(B_N - C_N)$		− 0 216			− 0 256			− 0 247			− 0 268
South Aspect	800	+ 7 15	− 0 20	810	+ 10 10	− 0 28	782	+ 18 24	− 0 20	800	+ 7 15	− 0 27
	810	+ 10 10	− 35	842	+ 14 51	− 22	789	+ 7 0	− 19	810	+ 10 10	− 27
	898	+ 17 17	− 32	898	+ 17 17	− 23	810	+ 10 10	− 32	898	+ 17 17	− 25
	945	+ 26 11	− 25	945	+ 26 11	− 33	842	+ 14 51	− 25	1023	+ 26 41	− 36
	1023	+ 26 41	− 27	1023	+ 26 41	− 27	898	+ 17 17	− 35	1034	+ 20 45	− 21
	1045	+ 20 21	− 08	1034	+ 20 45	− 33	945	+ 26 11	− 26	1057	+ 8 39	− 21
	1057	+ 8 39	− 30	1045	+ 20 21	− 27	1023	+ 26 41	− 28	1068	+ 9 21	− 18
	1068	+ 9 21	− 20	1057	+ 8 39	− 31	1045	+ 20 21	− 21	1079	+ 16 23	− 31
	1079	+ 16 23	− 28	1068	+ 9 21	− 19	1057	+ 8 39	− 23	1114	+ 15 4	− 25
	1135	+ 19 21	− 26	1079	+ 16 23	− 36	1068	+ 9 21	− 18	1135	+ 19 21	− 23
	1148	+ 20 35	− 32	1114	+ 15 4	− 25	1079	+ 16 23	− 22	1148	+ 20 35	− 30
				1135	+ 19 21	− 16	1135	+ 19 21	− 25			
				1143	+ 20 35	− 25	1143	+ 20 35	− 33			
	Mean $(B_S - C_S)$		− 0 257			− 0 265			− 0 252			− 0 258

Between Captain Burrard and Lieutenant Lenox-Conyngham

Observed with Telescope No 1												
By Stars of	At MOOLTAN (Latitude 30° 11′)						At KARACHI (Latitude 24° 51′)					
	March 16 1890			March 17 1890			April 16 1890			April 17 1890		
	Star	Declination	Equation B − C	Star	Declination	Equation B − C	Star	Declination	Equation B − C	Star	Declination	Equation B − C
North Aspect			″			″			″		′	″
	2793	+ 41 33	− 0 17	2999	+ 32 53	− 0 26	3842	+ 23 42	− 0 27	3842	+ 23 42	− 0 19
	2860	+ 36 49	− 18	3016	+ 31 0	− 18	3852	+ 33 42	− 14	3852	+ 33 42	− 25
	2871	+ 36 48	− 27	3033	+ 33 20	− 21	3913	+ 43 47	− 28	3913	+ 43 47	− 23
	2902	+ 31 6	− 23	3068	+ 32 41	− 28	3952	+ 44 14	− 21	3952	+ 44 14	− 16
	2984	+ 33 42	− 29	3097	+ 38 54	− 23	3965	+ 34 50	− 23	3965	+ 34 50	− 24
	2999	+ 32 53	− 16	3109	+ 30 6	− 28	3973	+ 42 20	− 20	3973	+ 42 20	− 15
	3016	+ 31 0	− 20	3144	+ 35 5	− 27	3981	+ 48 23	− 24	3981	+ 48 23	− 27
	3033	+ 33 20	− 17	3162	+ 37 16	− 22	3998	+ 35 33	− 13	3998	+ 35 33	− 22
	3068	+ 32 41	− 15	3241	+ 35 35	− 24	4010	+ 38 34	− 29	4010	+ 38 34	− 35
	3097	+ 38 54	− 14	3268	+ 36 19	− 26	4018	+ 41 32	− 29	4018	+ 41 32	− 18
	3144	+ 35 5	− 16	3297	+ 35 50	− 25	4057	+ 43 39	− 37	4057	+ 43 39	− 40
	3162	+ 37 16	− 25				4100	+ 27 54	− 39	4100	+ 27 54	− 29
	3241	+ 35 35	− 23									
	3268	+ 36 19	− 27									
	3297	+ 35 50	− 15									
	Mean ($B_N - C_N$)		− 0 201			− 0 244			− 0 253			− 0 244
South Aspect	2786	+ 27 35	− 0 30	2901	+ 6 5	− 0 23	3824	+ 15 0	− 0 37	3831	+ 20 44	− 0 35
	2815	+ 28 16	− 20	2917	+ 20 24	− 21	3831	+ 20 44	− 21	3862	+ 6 38	− 22
	2836	+ 14 34	− 20	2931	+ 20 16	− 24	3862	+ 6 38	− 28	3871	+ 7 11	− 27
	2889	+ 7 0	− 18	2943	+ 13 5	− 28	3871	+ 7 11	− 26	3886	+ 17 4	− 18
	2901	+ 6 5	− 24	2960	+ 29 10	− 24	3886	+ 17 4	− 34	3900	+ 3 28	− 30
	2917	+ 20 24	− 23	3053	+ 9 49	− 22	3900	+ 3 28	− 12	3919	+ 14 59	− 27
	2931	+ 20 16	− 23	3079	+ 24 53	− 25	3932	+ 17 24	− 13	3932	+ 17 24	− 16
	2942	+ 13 5	− 16	3123	+ 22 27	− 27	3940	+ 6 43	− 34	3940	+ 6 43	− 37
	3079	+ 24 53	− 19	3132	+ 15 26	− 27	4031	+ 16 16	− 21	4031	+ 16 16	− 23
	3109	+ 30 6	− 24	3201	+ 26 24	− 30	4049	+ 4 16	− 23	4049	+ 4 16	− 21
	3123	+ 22 27	− 17	3209	+ 17 4	− 29	4066	+ 22 4	− 16	4066	+ 22 4	− 23
	3132	+ 15 26	− 31	3227	+ 9 32	− 29	4114	+ 10 53	− 23	4114	+ 10 53	− 29
	3255	+ 28 51	− 16	3278	+ 16 56	− 24						
	3278	+ 16 56	− 23	3309	+ 26 25	− 29						
	3309	+ 26 25	− 32									
	Mean ($B_S - C_S$)		− 0 224			− 0 259			− 0 240			− 0 257

Between Captain Burrard and Lieutenant Lenox-Conyngham

Station	Telescope in use	Astronomical Date	Instrumental Position	By Stars of North Aspect: Mean Value of Equation $(B_N - C_N)$	By Stars of North Aspect: General Mean $(B_N - C_N)$	By Stars of South Aspect: Mean Value of Equation $(B_S - C_S)$	By Stars of South Aspect: General Mean $(B_S - C_S)$
DEHRA DUN	No 2	1889 October 16	I P W	s − 0 192	s − 0 238	s − 0 186	s − 0 222
		„ 17	„	− 247		− 216	
		„ 18	„	− 275		− 265	
AGRA	No 1	1889 December 18	I P W	− 0 216	− 0 247	− 0 257	− 0 258
		„ 19	„	− 256		− 265	
		„ 20	I P E	− 247		− 252	
		„ 21	„	− 268		− 258	
MOOLTAN	No 1	1890 March 16	I P E	− 0 201	− 0 223	− 0 224	− 0 242
		„ 17	„	− 244		− 259	
KARACHI	No 1	1890 April 16	I P W	− 0 253	− 0 249	− 0 240	− 0 249
		„ 17	„	− 244		− 257	
			Final Means		− 0 239		− 0 243

Final Values of the Equation Adopted

The difference between the final means of $(B_N - C_N)$ and $(B_S - C_S)$ is so small that a mean of the two has been adopted as applicable to all stars of all arcs

$$\text{Final adopted value } B - C = -\overset{s}{0}\ 241$$

The symbol B − C signifies a quantity which must be *added* to times observed by Lieutenant Lenox Conyngham before they are compared with those observed by Captain Burrard

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AGRA (E) *Lat* 27° 10′, *Long* 5ʰ 12ᵐ 14ˢ; AND MOOLTAN (W) *Lat* 30° 11′, *Long* 4ʰ 45ᵐ 56ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Pers'l Equations $B_E - C_E = -0^s 241$, $B_E - C_E = -0\ 241$	$\Delta L - \rho$
1889		°			h m s	s	s			h m s	s	s	m s				
Nov 15	698	+ 33 20	N	I P E	2 10 25 56	+ 1 41	26 97	N	I P W	2 36 46 03	− 0 08*	45 95	26 18 98	m s 26 19 095	+ 0 173	− 0 241	26 19 027
	714	+ 46 48	N	d c − 3 8	13 13 45	+ 1 37	14 82	N	d c − 2 4	39 32 34	+ 1 70	34 04	19 22				
	727	+ 40 54	N	b − 6 2 a − 1 0	15 38 58	+ 1 39	39 97	N	b − 1 4 a − 11 4	41 57 55	+ 1 66	59 21	19 24				
	772	+ 35 40	N	s Q + 1 67	25 2 30	+ 1 40	3 70	N	s Q + 1 71	51 21 01	+ 1 63	22 64	18 94				
	707	+ 19 24	S		2 11 39 29	+ 1 43	40 72	S		2 37 58 20	+ 1 57	59 77	26 19 05	m s 26 19 050	+ 0 173	− 0 241	26 18 982
	745	+ 10 7	S		18 34 04	+ 1 43	35 47	S		44 52 99	+ 1 54	54 53	19 06				
	755	+ 10 4	S		20 30 40	+ 1 44	31 84	S		46 49 36	+ 1 54	50 90	19 06				
	760	+ 7 58	S		21 57 36	+ 1 44	58 80	S		48 16 30	+ 1 53	17 83	19 03				
	821	+ 39 44	N	s Q − 1 67	2 34 60 69	− 1 95	58 74	N	s Q − 1 71	3 1 19 33	− 1 77	17 56	26 18 82	m s 26 19 003	+ 0 173	− 0 241	26 18 935
	829	+ 43 50	N		36 37 65	− 1 96	35 69	N		2 56 59	− 1 74	54 85	19 16				
	861	+ 28 47	N		41 3 68	− 1 93	1 75	N		7 22 60	− 1 82	20 78	19 03				
	798	+ 11 58	S		2 30 20 09	− 1 91	18 18	S		2 56 39 09	− 1 87	37 22	26 19 04	m s 26 19 033	+ 0 173	− 0 241	26 18 965
	808	+ 21 29	S		32 16 31	− 1 91	14 40	S		58 35 24	− 1 84	33 40	19 00				
	818	+ 26 35	S		33 57 46	− 1 93	55 53	S		3 0 16 30	− 1 83	14 47	18 94				
	844	+ 11 59	S		38 39 99	− 1 91	38 08	S		4 59 10	− 1 87	57 23	19 15				
Nov 16	698	+ 33 20	N	I P W	2 10 15 78	+ 1 52	17 30	N	I P W	2 36 34 98	+ 1 62	36 60	26 19 30	m s 26 19 170	+ 0 173	− 0 241	26 19 102
	714	+ 46 48	N	d c + 2 2	13 3 83	+ 1 40	5 23	N	d c − 2 4	39 22 77	+ 1 68	24 45	19 22				
	727	+ 40 54	N	b − 3 3 a + 15 7	15 28 93	+ 1 47	30 40	N	b − 2 0 a − 12 1	41 47 95	+ 1 65	49 60	19 20				
	772	+ 35 40	N	s Q + 1 60	24 52 67	+ 1 51	54 18	N	s Q + 1 71	51 11 53	+ 1 61	13 14	18 96				
	707	+ 19 24	S		2 11 29 49	+ 1 62	31 11	S		2 37 48 67	+ 1 55	50 22	26 19 11	m s 26 19 063	+ 0 173	− 0 241	26 18 995
	745	+ 10 7	S		18 24 27	+ 1 69	25 96	S		44 43 46	+ 1 53	44 99	19 03				
	760	+ 7 58	S		21 47 69	+ 1 70	49 39	S		48 6 92	+ 1 52	8 44	19 05				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in this case $Q = 0\ 00$.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AGRA (E) *Lat* 27° 10′, *Long* 5ʰ 12ᵐ 14ˢ AND MOOLTAN (W) *Lat* 30° 11, *Long* 4ʰ 45ᵐ 56ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard, with Telescope No 1: Stars Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Stars Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Persl Equations $B_N - C_N = -0\ 241$, $B_S - C_S = -0\ 241$	$\Delta L - \rho$
1889		°			h m s	s	s			h m s	s	s	m s				
Nov 16	829	+ 43 50	N	*I P W*	2 36 27 86	−1 77	26 09	N	*I P W*	3 2 47 02	−1 75	45 27	26 19 18	m s 26 19 170	+ 0 173	− 0 241	26 19 102
	861	+ 28 47	N	d c + 2 2, b − 3 3, a + 15 7, Q − 1 60 s	40 53 ,7	−1 63	52 14	N	d c − 2 4, b − 2 0, a − 12 1, Q − 1 71 s	7 13 13	−1 83	11 30	19 16				
	798	+ 11 58	S		2 30 10 14	−1 53	8 61	S		2 56 29 61	−1 89	27 ,6	26 19 15	m s 26 19 163	+ 0 1,3	− 0 241	26 19 095
	808	+ 21 29	S		32 6 38	−1 59	4 79	S		58 25 88	−1 86	24 02	19 23				
	813	+ 26 35	S		33 47 55	−1 62	45 93	S		3 0 6 96	−1 84	5 12	19 19				
	844	+ 11 59	S		38 30 11	−1 53	28 58	S		4 49 55	−1 89	47 66	19 08				
Nov 17	698	+ 33 20	N	*I P W*	2 10 6 39	+1 46	7 85	N	*I P E*	2 36 25 22	+1 81	2, 03	6 19 18	m s 26 19 185	+ 0 171	− 0 241	26 19 115
	714	+ 46 48	N	d c + 2 2, b − 5 9, a + 14 0, Q + 1 60 s	12 54 43	+1 34	55 77	N	d c + 0 8, b + 3 4, a + 1 7, Q + 1 70 s	39 13 21	+1 82	1, 03	19 26				
	727	+ 40 54	N		15 19 52	+1 40	20 92	N		41 38 32	+1 81	40 13	19 21				
	772	+ 35 40	N		24 43 23	+1 44	44 67	N		51 1 95	+1 81	3 76	19 09				
	707	+ 19 24	S		2 11 20 05	+1 55	21 60	S		2 3, 38 98	+1 81	40 79	26 19 19	m s 26 19 153	+ 0 171	− 0 241	26 19 083
	745	+ 10 7	S		18 14 86	+1 61	16 4,	S		44 33 81	+1 80	3, 61	19 14				
	755	+ 10 4	S		20 11 20	+1 61	11 81	S		46, 30 14	+1 80	31 94	19 13				
	760	+ 7 58	S		21 38 19	+1 62	39 81	S		47 57 16	+1 80	58 96	19 15				
	821	+ 39 44	N	Q − 1 60 s	2 34 41 41	−1 80	39 61	N	Q − 1 70 s	3 0 60 35	−1 59	58 ,6	26 19 15	m s 26 19 163	+ 0 171	− 0 241	26 19 093
	829	+ 43 50	N		36 18 48	−1 83	16 65	N		2 3, 38	−1 59	35 79	19 14				
	861	+ 28 47	N		40 44 38	−1 70	42 68	N		7 3 47	−1 59	1 88	19 20				
	798	+ 11 58	S		2 29 60 64	−1 60	59 04	S		2 56 19 88	−1 60	18 28	26 19 24	m s 26 19 248	+ 0 171	− 0 241	26 19 178
	808	+ 21 29	S		31 56 92	−1 66	55 26	S		58 16 09	−1 59	14 50	19 24				
	813	+ 26 35	S		33 38 13	−1 69	36 44	S		59 57 30	−1 59	55 71	19 27				
	844	+ 11 59	S		38 20 50	−1 60	18 90	S		3 4 39 ,4	−1 60	38 14	19 24				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - {}^{*}\rho$

AGRA (E) *Lat* 27° 10′ *Long* $5^h\ 12^m\ 14^s$ AND MOOLTAN (W) *Lat* 30° 11′, *Long* $4^h\ 45^m\ 56^s$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $B_N - C_N = -0.241$, $B_S - C_S = -0.241$	$\Delta L - \rho$
					h m s	s	s			h m s	s	s	m s				
1889 Nov 18	698	+ 33 20	N	I P E	2 9 56 80	+1 70	58 50	N	I P E	2 36 17 40	+0 10*	17 50	26 19 00	m s 26 19 098	+ 0 171	− 0 241	26 19 028
	714	+ 46 48	N	d c − 3 8	12 44 19	+2 28	46 47	N	d c + 0 8	39 0 53	+0 16*	5 69	19 22				
	727	+ 40 54	N	b − 0 2 a −73 9	15 9 61	+2 00	11 61	N	b + 2 6 a − 4 9	41 30 62	+0 13*	30 75	19 14				
	772	+ 35 40	N	Q + 1 60 s	24 33 55	+1 79	35 34	N	Q + 1 70 s	50 52 57	+1 80	54 37	19 03				
	707	+ 19 24	S		2 11 11 01	+1 27	12 28	S		2 37 31 28	+0 06*	31 34	26 19 06	m s 26 19 030	+ 0 171	− 0 241	26 18 960
	745	+ 10 7	S		18 6 13	+1 01	7 14	S		44 24 41	+1 74	26 15	19 01				
	755	+ 10 4	S		20 2 54	+1 01	3 55	S		46 20 86	+1 74	22 60	19 05				
	760	+ 7 58	S		21 29 55	+0 96	30 51	S		47 47 18	+1 73	49 51	19 00				
	786	+ 34 13	N	Q − 1 60 s	2 28 19 67	−1 47	18 20	N	Q − 1 70 s	2 54 38 71	−1 60	37 11	26 18 91	m s 26 18 973	+ 0 171	− 0 241	26 18 903
	821	+ 39 44	N		34 31 54	−1 25	30 29	N		3 0 50 92	−1 59	49 33	19 04				
	861	+ 28 47	N		40 35 04	−1 66	33 38	N		6 53 96	−1 61	52 35	18 97				
	808	+ 21 29	S		2 31 47 81	−1 87	45 94	S		2 58 6 67	−1 64	5 03	26 19 09	m s 26 19 073	+ 0 171	− 0 241	26 19 003
	813	+ 26 35	S		33 28 84	−1 73	27 11	S		59 47 88	−1 62	46 26	19 15				
	844	+ 11 59	S		38 11 86	−2 13	9 73	S		3 4 50 37	−1 66	28 71	18 98				
Nov 19	698	+ 33 20	N	I P E	2 9 47 72	+1 39	49 11	N	I P E	2 36 6 22	+1 81	8 03	26 18 92	m s 26 18 983	+ 0 172	− 0 241	26 18 914
	714	+ 46 48	N	d c − 3 8	12 35 76	+1 36	37 12	N	d c + 0 8	38 54 16	+1 91	56 07	18 95				
	727	+ 40 54	N	b − 4 4 a − 1 9	15 0 89	+1 37	2 26	N	b + 3 3 a −10 5	41 19 34	+1 86	21 20	18 94				
	772	+ 35 40	N	Q + 1 60 s	24 24 43	+1 39	25 82	N	Q + 1 68 s	50 43 12	+1 82	44 94	19 12				
	707	+ 19 24	S		2 11 1 51	+1 39	2 90	S		2 37 20 11	+1 73	21 84	26 18 94	m s 26 18 995	+ 0 172	− 0 241	26 18 926
	745	+ 10 7	S		17 56 32	+1 40	57 72	S		44 15 01	+1 69	16 0	18 98				
	755	+ 10 4	S		19 52 10	+1 40	54 10	S		46 11 50	+1 69	13 19	19 09				
	760	+ 7 58	S		21 19 71	+1 41	21 12	S		47 38 41	+1 68	40 09	18 97				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases $Q = 0.00$

AGRA (E) *Lat* 27° 10′, *Long* $5^h\ 12^m\ 14^s$ AND MOOLTAN (W) *Lat* 30° 11′, *Long* $4^h\ 45^m\ 56^s$

Astronomical Date	Star		Transits Observed at E — *By Burrard with Telescope No 1*					Transits Observed at W — *By Lenox Conyngham, with Telescope No 2*					Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns for Persl Equations $B_N - C_N = -0^s\ 241$, $B_S - C_S = -0\ 241$	$\Delta L - \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1889					h m s	s	s			h m s	s	s	m s				
Nov 19	786	+ 34 13	N	*I P E*	2 28 10 58	− 1 81	8 71	N	*I P E*	2 54 29 21	− 1 55	27 66	26 18 89	m s 26 18 885	+ 0 172	− 0 241	26 18 816
	821	+ 39 44	N	d c − 3 8	34 22 71	− 1 82	20 89	N	d c + 0 8	3 0 41 25	− 1 52	39 73	18 84				
	829	+ 43 50	N	b − 4 4 a − 1 9	35 59 76	− 1 83	57 93	N	b + 3 3 a − 10 5	2 18 38	− 1 48	16 90	18 97				
	861	+ 28 47	N	s Q − 1 60	40 25 79	− 1 81	23 98	N	s Q − 1 68	6 44 41	− 1 59	42 82	18 84				
	798	+ 11 58	S		2 29 42 18	− 1 80	40 38	S		2 55 61 11	− 1 67	59 44	26 19 06	m s 26 18 995	+ 0 1,2	− 0 41	26 18 926
	808	+ 21 29	S		31 38 38	− 1 80	36 58	S		57 57 19	− 1 62	55 57	18 99				
	813	+ 26 35	S		33 19 58	− 1 81	17 77	S		59 38 27	− 1 60	36 67	18 90				
	844	+ 11 59	S		38 2 04	− 1 80	0 24	S		3 4 20 94	− 1 67	19 27	19 03				
Nov 20	698	+ 33 20	N	*I P E*	2 9 38 27	+ 1 38	39 65	N	*I P W*	2 35 56 95	+ 1 69	58 64	26 18 99	m s 26 18 968	+ 0 171	− 0 241	26 18 898
	714	+ 46 48	N	d c − 3 8	12 26 33	+ 1 24	27 57	N	d c − 2 4	38 44 ,6	+ 1 ,9	46 55	18 98				
	727	+ 40 54	N	b − 3 5 a + 12 3	14 51 4(	+ 1 31	52 ,7	N	b + 3 0 a − 14 0	41 9 97	+ 1 75	11 72	18 95				
	772	+ 35 40	N	s Q + 1 61	24 15 07	+ 1 36	16 43	N	s Q + 1 65	50 33 68	+ 1 70	35 38	18 95				
	707	+ 19 24	S		2 10 52 02	+ 1 48	5 50	S		2 37 10 86	+ 1 60	12 46	26 18 96	m s 26 18 953	+ 0 1,1	− 0 241	26 18 883
	740	+ 10 7	S		17 46 ,6	+ 1 52	48 28	S		44 5 66	+ 1 55	7 21	18 93				
	755	+ 10 4	S		19 43 12	+ 1 52	44 64	S		46 2 08	+ 1 55	3 63	18 99				
	760	+ 7 58	S		21 10 12	+ 1 54	11 66	S		47 29 05	+ 1 54	30 59	18 93				
	786	+ 34 13	N	s Q − 1 61	2 27 61 21	− 1 84	59 37	N	s Q − 1 65	2 54 19 86	− 1 61	18 25	26 18 88	m s 26 18 933	+ 0 171	− 0 241	26 18 863
	821	+ 39 44	N		34 13 26	− 1 90	11 36	N		3 0 31 84	− 1 56	30 28	18 92				
	829	+ 43 50	N		35 50 39	− 1 94	48 45	N		2 8 97	− 1 53	7 44	18 99				
	861	+ 28 47	N		40 16 31	− 1 81	14 50	N		6 35 08	− 1 64	33 44	18 94				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL − ρ

AGRA (E) Lat 27° 10′ Long 5h 12m 14s; AND MOOLTAN (W) Lat 30° 11 Long 4h 45m 56s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $B_N - C_N = -0^s 241$, $B_S - C_S = -0\ 241$	ΔL − ρ
1889		°			h m s	s	s			h m s	s	s	m s				
Nov 20	708	+ 11 58	S	I P E	2 29 32 80	−1 71	31 09	S	I P W	2 55 51 62	−1 73	49 89	26 18 80	m s 26 18 903	+ 0 171	− 0 241	26 18 833
	808	+ 21 29	S	d c − 3 8	31 29 02	−1 75	27 27	S	d c − 2 4	57 47 83	−1 69	46 14	18 87				
	813	+ 26 35	S	b − 3 5 a + 12 3	33 10 11	−1 80	8 31	S	b + 3 0 a − 14 0	59 28 92	−1 65	27 27	18 96				
	844	+ 11 59	S	s Q − 1 61	37 52 64	−1 71	50 93	S	s Q − 1 65	3 4 11 64	−1 73	9 91	18 98				
Nov 22	698	+ 37 20	N	I P W	2 9 19 28	+1 56	20 84	N	I P E	2 35 38 36	+1 80	40 16	26 19 32	m s 26 19 243	+ 0 170	− 0 241	26 19 172
	714	+ 46 48	N	d c + 2	12 7 17	+1 60	8 7	N	d c + 0 8	38 26 19	+1 80	27 99	19 22				
	727	+ 40 54	N	b − 1 3 a − 5 6	14 32 40	+1 58	33 98	N	b + 8 3 a + 1 8	40 51 40	+1 80	53 20	19 22				
	772	+ 35 40	N	s Q + 1 51	23 56 07	+1 55	57 62	N	s Q + 1 69	50 15 03	+1 80	16 83	19 21				
	707	+ 19 24	S		2 10 33 10	+1 51	34 61	S		2 36 52 05	+1 80	53 85	26 19 24	m s 26 19 45	+ 0 170	− 0 241	26 19 174
	745	+ 10	S		17 27 90	+1 49	29 39	S		43 46 85	+1 79	48 64	19 25				
	765	+ 10 4	S		19 24 8	+1 49	25 71	S		45 43 21	+1 79	45 00	19 23				
	760	+ 7 58	S		20 51 28	+1 49	52 77	S		47 10 23	+1 80	12 03	19 26				
	786	+ 34 13	N	s Q − 1 51	2 27 42 04	−1 46	40 58	N	s Q − 1 69	2 53 61 23	−1 58	59 65	26 19 07	m s 26 19 075	+ 0 170	− 0 241	26 19 004
	821	+ 39 44	N		33 54 05	−1 45	52 60	N		3 0 13 26	−1 59	11 67	19 07				
	829	+ 43 50	N		35 31 11	−1 43	29 68	N		1 50 34	−1 58	48 76	19 08				
	861	+ 28 47	N		39 57 26	−1 48	55 78	N		6 16 45	−1 59	14 86	19 08				
	798	+ 11 58	S		2 29 13 67	−1 52	12 15	S		2 55 32 80	−1 59	31 21	26 19 06	m s 26 19 073	+ 0 170	− 0 241	26 19 002
	808	+ 21 29	S		31 9 86	−1 50	8 36	S		57 29 01	−1 58	27 43	19 07				
	813	+ 26 35	S		32 50 99	−1 48	49 51	S		59 10 24	−1 59	8 65	19 14				
	844	+ 11 59	S		37 33 67	−1 52	32 15	S		3 3 32 76	−1 59	51 17	19 02				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + p$

AGRA (E) *Lat* 27° 10′ *Long* 5ʰ 12ᵐ 14 AND MOOLTAN (W) *Lat* 30° 11, *Long* 4ʰ 45ᵐ 56ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $B_E - C_E = -0\ 241$, $B_S - C_S = -0\ 241$	$\Delta L + p$
1889		°			h m s	s	s			h m s	s	s	m s				
Nov 15	1101	+ 31 19	N	*I P E*	3 2 14 33	+1 41	15 74	N	*I P W*	3 28 33 71	+1 62	35 33	26 19 59	m s 26 19 505	− 0 139	− 0 241	26 19 125
	1132	+ 33 37	N	d c − 3 8 b − 6 2 a − 1 0 s Q + 1 67	8 51 31	+1 40	52 71	N	d c − 2 4 b − 1 4 a − 11 4 s Q + 1 71	35 10 50	+1 63	12 13	19 42				
	1068	+ 9 21	S		2 54 39 32	+1 44	40 76	S		3 20 58 76	+1 54	60 30	26 19 54	m s 26 19 463	− 0 139	− 0 241	26 19 083
	1079	+ 16 23	S		56 56 98	+1 44	58 42	S		23 16 31	+1 56	17 87	19 45				
	1087	+ 12 33	S		58 15 00	+1 43	16 43	S		24 34 28	+1 55	35 83	19 40				
	1092	+ 9 0	S		3 0 5 80	+1 44	7 24	S		26 25 16	+1 54	26 70	19 46				
	1138	+ 31 56	N	s Q − 1 67	3 10 55 60	−1 93	53 67	N	s Q − 1 71	3 37 13 10	−0 09*	13 01	26 19 34	m s 26 19 410	− 0 139	− 0 241	26 19 030
	1219	+ 39 41	N		23 58 87	−1 95	56 92	N		50 18 18	−1 77	16 41	19 49				
	1228	+ 35 28	N		25 20 11	−1 94	18 17	N		51 39 36	−1 79	3 57	19 40				
	1151	+ 24 7	S		3 12 9 91	−1 91	8 00	S		3 38 27 49	−0 12*	27 37	26 19 37	m s 26 19 410	− 0 139	− 0 241	26 19 030
	1192	+ 25 15	S		17 12 43	−1 90	10 53	S		43 31 80	−1 82	29 98	19 45				
Nov 16	1101	+ 31 19	N	*I P W*	3 2 21 72	+1 54	23 26	N	*I P W*	3 28 41 40	+1 61	43 01	26 19 75	m s 26 19 693	− 0 137	− 0 241	26 19 315
	1105	+ 42 13	N	d c + 2 2 b − 3 3 a + 15 7	4 8 43	+1 45	9 88	N	d c − 2 4 b − 2 0 a − 12 1	30 28 04	+1 66	29 70	19 82				
	1123	+ 37 14	N		7 32 76	+1 49	34 25	N		33 52 27	+1 62	53 89	19 64				
	1132	+ 33 37	N	s Q + 1 60	8 58 82	+1 52	60 34	N	s Q + 1 71	35 18 28	+1 62	19 90	19 56				
	1068	+ 9 21	S		2 54 46 66	+1 69	48 35	S		3 21 6 53	+1 52	8 05	26 19 70	m s 26 19 705	− 0 137	− 0 241	26 19 327
	1079	+ 16 23	S		57 4 28	+1 64	5 92	S		23 24 08	+1 53	25 61	19 69				
	1087	+ 12 33	S		58 22 19	+1 67	23 86	S		24 42 07	+1 54	43 61	19 75				
	1092	+ 9 0	S		3 0 13 10	+1 69	14 79	S		26 32 95	+1 52	34 47	19 68				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) *Lat 27° 10′, Long 5h 12m 14s* AND MOOLTAN (W) *Lat 30° 11′ Long 4h 45m 56s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham, with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Correct ed Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $B_N - C_N = -0^s 241$ $B_S - C_S = -0 241$	$\Delta L + \rho$
1889					h m s	s	s			h m s	s	s	m s				
Nov 16	1175	+ 32 45	N	*I P W*	3 16 1, 18	−1 67	11 51	N	*I P W*	3 42 33 17	−1 81	31 36	26 19 85	s 26 19 810	− 0 137	− 0 241	26 19 432
	1219	+ 39 41	N	d c + 2 2	24 6 11	−1 73	4 38	N	d c − 2 4	50 25 97	−1 78	24 19	19 81				
	1228	+ 35 28	N	b − 3 3 a + 15 7	25 27 44	−1 69	25 75	N	b − 2 0 a − 12 1	51 47 32	−1 80	45 52	19 77				
				s Q − 1 60					s Q − 1 71								
	1166	+ 23 46	S		3 14 34 32	−1 61	32 71	S		3 40 54 33	−1 85	52 48	26 19 77	s 26 19 725	− 0 137	− 0 241	26 19 347
	1192	+ 25 15	S		17 19 73	−1 61	18 12	S		43 39 65	−1 85	3, 80	19 68				
Nov 17	1101	+ 31 19	N	*I P W*	3 2 29 24	+1 48	30 72	N	*I P E*	3 28 48 62	+1 81	50 43	26 19 71	s 26 19 630	− 0 136	− 0 241	26 19 253
	1105	+ 42 13	N	d c + 2 2	4 16 12	+1 38	17 50	N	d c + 0 8	30 35 29	+1 81	37 10	19 60				
	1123	+ 37 14	N	b − 5 9 a + 14 0	7 40 37	+1 43	41 80	N	b + 3 4 a + 1 7	33 59 52	+1 80	61 32	19 52				
	1132	+ 33 37	N	s Q + 1 60	9 6 17	+1 46	, 63	N	s Q + 1 70	35 25 51	+1 81	27 32	19 69				
	1068	+ 9 21	S		2 54 54 21	+1 62	55 83	S		3 21 13 67	+1 80	15 47	26 19 64	s 26 19 695	− 0 136	− 0 241	26 19 318
	1079	+ 16 23	S		5, 11 81	+1 57	13 38	S		23 31 30	+1 81	33 11	19 73				
	1087	+ 12 33	S		58 29 77	+1 60	31 37	S		24 49 23	+1 80	51 03	19 66				
	1092	+ 9 0	S		3 0 20 59	+1 62	22 21	S		26 40 16	+1 80	41 96	19 75				
	1138	+ 31 56	N	s Q − 1 60	3 11 10 38	−1 73	8 65	N	s Q − 1 70	3 37 29 89	−1 59	28 30	26 19 65	s 26 19 647	− 0 136	− 0 241	26 19 270
	1175	+ 32 45	N		16 20 69	−1 74	18 95	N		42 40 17	−1 59	38 58	19 63				
	1228	+ 35 28	N		25 34 99	−1 76	33 23	N		51 54 48	−1 59	52 89	19 66				
	1151	+ 24 7	S		3 12 24 68	−1 67	23 01	S		3 38 44 27	−1 60	42 67	26 19 66	s 26 19 695	− 0 136	− 0 241	26 19 318
	1154	+ 24 1	S		13 1 95	−1 67	0 28	S		39 21 53	−1 60	19 93	19 65				
	1166	+ 23 46	S		14 41 ,8	−1 67	40 11	S		40 61 43	−1 60	59 83	19 ,2				
	1192	+ 25 15	S		17 27 24	−1 67	25 57	S		43 46 92	−1 60	45 32	19 75				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) *Lat* 27° 10′ *Long* $5^h\ 12^m\ 14^s$; AND MOOLTAN (W) *Lat* 30° 11′ *Long* $4^h\ 45^m\ 56^s$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $B_E - C_E = -0^s\ 241$; $B_S - C_S = -0\ 241$	$\Delta L + \rho$
1889		°			h m s	s	s			h m s	s	s	m s				
Nov 19	1101	+ 31 19	N	*I P E*	3 2 44 58	+ 1 39	45 97	N	*I P E*	3 29 3 55	+ 1 80	5 35	26 19 38				
	1105	+ 42 13	N	d c − 3 8	4 31 25	+ 1 38	32 63	N	d c + 0 8	30 50 21	+ 1 8,	52 08	19 45	m s 26 19 398	− 0 136	− 0 241	26 19 021
	1123	+ 37 14	N	b − 4 4 a − 1 9	7 55 54	+ 1 38	56 92	N	b + 3 3 a − 10 5	34 14 46	+ 1 83	16 29	19 37				
	1132	+ 33 37	N	s Q + 1 60	9 21 57	+ 1 39	22 96	N	s Q + 1 68	35 40 54	+ 1 81	42 35	19 39				
	1068	+ 9 21	S		2 55 9 66	+ 1 40	11 06	S		3 21 28 ,9	+ 1 68	30 47	26 19 41				
	1087	+ 12 33	S		58 45 26	+ 1 40	46 66	S		25 4 42	+ 1 70	6 12	19 46	m s 26 19 453	− 0 136	− 0 241	26 19 076
	1092	+ 9 0	S		3 0 36 04	+ 1 40	37 44	S		26 55 25	+ 1 68	56 93	19 49				
	1138	+ 31 56	N	s Q − 1 60	3 11 25 ,2	− 1 82	23 90	N	s Q − 1 68	3 37 44 86	− 1 56	43 30	26 19 40				
	1175	+ 32 45	N		16 35 95	− 1 82	34 13	N		42 55 08	− 1 56	53 52	19 39	m s 26 19 413	− 0 136	− 0 241	26 19 036
	1219	+ 39 41	N		24 28 93	− 1 82	27 11	N		50 48 00	− 1 52	46 48	19 37				
	1228	+ 35 28	N		25 50 15	− 1 81	48 34	N		52 9 37	− 1 54	7 83	19 49				
	1151	+ 24 7	S		3 12 39 99	− 1 80	38 19	S		3 38 59 20	− 1 61	57 59	26 19 40				
	1154	+ 24 1	S		13 17 34	− 1 80	15 54	S		39 36 50	− 1 61	34 89	19 35	m s 26 19 373	− 0 136	− 0 241	26 18 996
	1166	+ 23 46	S		14 5, 27	− 1 80	5, 47	S		41 16 41	− 1 61	14 80	19 33				
	1192	+ 25 15	S		17 42 60	− 1 79	40 81	S		44 1 82	− 1 60	0 22	19 41				
Nov. 20	1101	+ 31 19	N	*I P E*	3 2 51 86	+ 1 40	53 26	N	*I P W*	3 29 11 16	+ 1 68	12 84	26 19 58				
	1105	+ 42 13	N	d c − 3 8	4 38 69	+ 1 30	39 99	N	d c − 2 4	30 57 71	+ 1 76	59 47	19 48	m s 26 19 428	− 0 133	− 0 241	26 19 054
	1123	+ 37 14	N	b − 3 5 a + 12 3	8 2 99	+ 1 34	4 33	N	b + 3 0 a − 14 0	34 21 93	+ 1 71	23 64	19 31				
	1132	+ 33 37	N	s Q + 1 61	9 28 89	+ 1 38	30 27	N	s Q + 1 65	35 47 92	+ 1 69	49 61	19 34				
	1068	+ 9 21	S		2 55 16 87	+ 1 52	18 39	S		3 21 36 34	+ 1 55	37 89	26 19 50				
	1079	+ 16 23	S		57 34 47	+ 1 49	35 96	S		23 53 88	+ 1 58	55 46	19 50	m s 26 19 435	− 0 133	− 0 241	26 19 061
	1087	+ 12 33	S		58 52 44	+ 1 51	53 95	S		25 11 75	+ 1 57	13 32	19 37				
	1092	+ 9 0	S		3 0 43 32	+ 1 53	44 85	S		27 2 67	+ 1 55	4 22	19 37				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) *Lat 27° 10′ Long 5h 12m 14s* AND MOOLTAN (W) *Lat. 30° 11′, Long. 4h 45m 56s*

Astronomical Date	Star: B.A.C. Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham, with Telescope No 9): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Difference of Corrected Times (W − E): Mean of Group	Correction for Rate of W Clock	Corrns. for Persl Equations $B_E - C_E = -0^s.241$, $B_S - C_S = -0.241$	$\Delta L + \rho$
1889					h m s	s	s			h m s	s	s	m s				
Nov 20	1175	+ 32 45	N	*I P E* d c − 3 8 b − 3 5 a + 12 3 Q − 1 61 s	3 16 43 42	− 1 83	41 59	N	*I P W* d c − 2 4 b + 3 0 a − 14 0 Q − 1 65 s	3 43 2 50	− 1 61	0 89	26 19 30	m s 26 19 293	− 0 133	− 0 241	26 18 919
	1219	+ 39 41	N		24 36 46	− 1 90	34 56	N		50 55 36	− 1 56	53 80	19 24				
	1228	+ 35 28	N		25 57 66	− 1 86	55 80	N		52 16 74	− 1 60	15 14	19 34				
	1192	+ 25 15	S		3 1, 49 93	− 1 77	48 16	S		3 44 9 21	− 1 67	7 54	26 19 38	m s 26 19 380	− 0 133	− 0 241	26 19 006
Nov 21	1101	+ 31 19	N	*I P W* d c + 2 2 b − 1 4 a − 3 0 Q + 1 54 s	3 2 58 89	+ 1 57	60 46	N	*I P W* d c − 2 4 b + 2 8 a − 0 7 Q + 1 65 s	3 29 18 71	+ 1 66	20 37	26 19 91	m s 26 19 867	− 0 134	− 0 241	26 19 492
	1105	+ 42 13	N		4 45 50	+ 1 59	47 09	N		31 5 39	+ 1 66	7 05	19 96				
	1132	+ 33 3/	N		9 35 87	+ 1 57	37 44	N		35 15 50	+ 1 67	57 17	19 73				
	1068	+ 9 21	S		2 55 24 02	+ 1 54	25 56	S		3 21 43 62	+ 1 65	45 27	26 19 71	m s 26 19 740	− 0 134	− 0 241	26 19 365
	1079	+ 16 23	S		57 41 66	+ 1 55	43 21	S		24 1 26	+ 1 65	2 91	19 70				
	1087	+ 12 33	S		58 59 51	+ 1 54	61 05	S		25 19 15	+ 1 66	20 81	19 76				
	1092	+ 9 0	S		3 0 50 44	+ 1 54	51 98	S		27 10 12	+ 1 65	11 77	19 79				
	1188	+ 31 56	N	Q − 1 54 s	3 11 39 99	− 1 51	38 48	N	Q − 1 65 s	3 37 59 75	− 1 64	58 11	26 19 63	m s 26 19 648	− 0 134	− 0 241	26 19 273
	1175	+ 32 45	N		16 50 23	− 1 51	48 72	N		43 9 97	− 1 64	8 33	19 61				
	1219	+ 39 41	N		24 43 16	− 1 50	41 66	N		51 3 01	− 1 64	1 37	19 71				
	1228	+ 35 28	N		26 4 50	− 1 51	2 99	N		52 22 62	+ 0 01*	22 63	19 64				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in this case Q = 0 00.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) *Lat* 27° 10′, *Long* 5ʰ 12ᵐ 14ˢ AND MOOLTAN (W) *Lat* 30° 11′ *Long* 4ʰ 45ᵐ 56ˢ

Astronomical Date	Star		Transits Observed at E — By Burrard, with Telescope No 1					Transits Observed at W — By Lenox Conyngham with Telescope No 2					Difference of Corrected Times (W − E)		Correction for Rate of W Clock	Corrns for Persl Equations $B_N - C_N = -0^s\,241$ $B_S - C_S = -0\,241$	$\Delta L + \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1889		° ′			h m s	s	s			h m s	s	s	m s				
Nov 21	1151	+ 24 7	S	*I P W*	3 12 54 36	−1 52	52 84	S	*I P W*	3 39 14 32	−1 64	12 68	26 19 84	m s 26 19 ,93	− 0 134	− 0 241	26 19 418
	1154	+ 24 1	S	d c + 2 2	13 31 62	−1 52	30 10	S	d c − 2 4	39 51 48	−1 64	49 84	19 74				
	1192	+ 25 15	S	b − 1 4 a − 3 0	17 56 90	−1 52	55 38	S	b + 2 8 a − 0 7	44 16 82	−1 64	15 18	19 80				
				s Q − 1 54					s Q − 1 65								
Nov 22	1101	+ 31 19	N	*I P W*	3 3 6 51	+1 55	8 06	\	*I P F*	3 29 25 78	+1 80	27 38	26 19 52	m s 26 19 593	− 0 136	− 0 241	26 19 216
	1105	+ 42 13	N	d c + 2 2	4 53 11	+1 58	54 69	N	d c + 0 8	31 12 59	+1 80	14 39	19 70				
	1123	+ 3, 14	N	b − 1 3 a − 5 6	8 17 42	+1 56	18 98	N	b + 3 3 a + 1 8	34 36 ,7	+1 ,9	38 56	19 58				
	1132	+ 33 37	N	s Q + 1 51	9 43 45	+1 56	45 01	N	s Q + 1 69	36 2 78	+1 80	4 38	19 57				
	1068	+ 9 21	S		2 55 31 ,2	+1 49	33 21	S		3 21 50 89	+1 79	52 68	26 19 47	m s 26 19 568	− 0 136	− 0 241	26 19 191
	1079	+ 16 23	S		5, 49 20	+1 51	50 71	S		24 8 55	+1 79	10 34	19 63				
	1087	+ 12 33	S		59 7 21	+1 50	8 71	S		25 26 52	+1 79	28 31	19 60				
	1092	+ 9 0	S		3 0 58 06	+1 49	59 55	S		27 1, 33	+1 79	19 12	19 57				
	1138	+ 31 56	N	s Q − 1 51	3 11 47 41	−1 47	45 94	N	s Q − 1 69	3 38 7 05	−1 58	5 47	26 19 53	m s 26 19 585	− 0 136	− 0 241	26 19 208
	1175	+ 32 45	N		16 57 64	−1 47	56 17	N		43 17 40	−1 58	15 82	19 65				
	1219	+ 39 41	N		24 50 6,	−1 45	49 22	N		51 10 43	−1 59	8 84	19 62				
	1228	+ 35 28	N		26 11 94	−1 47	10 47	N		52 31 59	−1 58	30 01	19 54				
	1151	+ 24 7	S		3 13 1 78	−1 50	0 28	S		3 39 21 56	−1 59	19 97	26 19 69	m s 26 19 645	− 0 136	− 0 241	26 19 268
	1154	+ 24 1	S		13 39 05	−1 50	37 55	S		39 58 78	−1 59	57 19	19 64				
	1166	+ 23 46	S		15 18 98	−1 50	17 48	S		41 38 64	−1 59	37 05	19 57				
	1192	+ 25 15	S		18 4 36	−1 49	2 87	S		44 24 14	−1 59	22 55	19 68				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AGRA (E) *Lat* 27° 10′ *Long* $5^h\ 12^m\ 14^s$ AND KARACHI (W) *Lat* 24° 51′ *Long* $4^h\ 28^m\ 18^s$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Persl. Equations $B_E - C_E = -0\ 241$, $B_S - C_S = -0\ 241$	$\Delta L - \rho$
1889		°			h m s	s	s			h m s	s	s	m s				
Dec 1	916	+ 40 36	N	*I P E* d c − 2 7 b − 4 5 a − 25 2 s Q + 1 48	2 52 54 86	+ 1 44	56 30	N	*I P W* d c − 1 4 b − 1 3 a − 99 5 s Q + 1 60	3 36 54 76	+ 2 32	57 08	44 0 78	m s 44 0 780	+ 0 211	− 0 241	44 0 750
	905	+ 7 57	S		2 50 42 36	+ 1 13	43 49	S		3 34 43 39	+ 0 88	44 27	44 0 78	m s 44 0 800	+ 0 211	− 0 241	44 0 770
	929	+ 8 28	S		54 10 74	+ 1 14	11 88	S		38 11 80	+ 0 90	12 70	0 82				
	981	+ 39 12	N	s Q − 1 48	3 4 35 60	− 1 54	34 06	N	s Q − 1 60	3 48 35 81	− 0 96	34 85	44 0 79	m s 44 0 773	+ 0 211	− 0 241	44 0 743
	1006	+ 43 37	N		10 47 55	− 1 47	46 08	N		54 47 53	− 0 69	46 84	0 76				
	1017	+ 33 49	N		12 15 27	− 1 59	13 68	N		56 15 73	− 1 25	14 48	0 80				
	1025	+ 28 39	N		14 5 28	− 1 64	3 64	N		58 5 88	− 1 50	4 38	0 74				
	950	+ 3 55	S		2 56 61 43	− 1 85	59 58	S		3 41 2 77	− 2 48	0 29	44 0 71	m s 44 0 805	+ 0 211	− 0 241	44 0 775
	957	+ 24 50	S		59 23 89	− 1 69	22 0	S		43 24 75	− 1 66	23 09	0 89				
	986	+ 19 19	S		3 5 44 69	− 1 73	42 96	S		49 45 62	− 1 89	43 73	0 77				
	991	+ 6 15	S		6 60 57	− 1 83	58 74	S		50 61 97	− 2 38	59 59	0 85				
Dec 2	861	+ 28 48	N	*I P W* d c + 1 1 b − 3 1 a − 73 0 s Q + 1 49	2 41 35 76	+ 1 49	37 25	N	*I P W* d c − 1 4 b − 1 3 a − 4 4 s Q + 1 59	3 25 36 79	+ 1 53	38 32	44 1 07	m s 44 1 010	+ 0 210	− 0 241	44 0 979
	877	+ 34 36	N		44 58 29	+ 1 70	59 99	N		28 59 40	+ 1 54	60 94	0 95				
	888	+ 37 53	N		46 59 99	+ 1 82	61 81	N		31 1 28	+ 1 54	2 82	1 01				
	916	+ 40 36	N		52 47 28	+ 1 93	49 21	N		36 48 67	+ 1 55	50 22	1 01				
	852	+ 4 15	S		2 39 49 80	+ 0 81	50 61	S		3 23 50 12	+ 1 50	51 62	44 1 01	m s 44 1 020	+ 0 210	− 0 241	44 0 989
	867	+ 17 50	S		42 36 53	+ 1 17	37 70	S		26 37 20	+ 1 52	38 72	1 02				
	905	+ 7 56	S		50 35 51	+ 0 90	36 41	S		34 35 99	+ 1 50	37 49	1 08				
	929	+ 8 28	S		54 3 94	+ 0 91	4 85	S		38 4 32	+ 1 50	5 82	0 97				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AGRA (E) *Lat* 27° 10′, *Long* 5ʰ 12ᵐ 14ˢ AND KARACHI (W) *Lat* 24° 51′, *Long* 4ʰ 28ᵐ 18ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Pers'l Equations $B_E - C_E = -0^s 241$, $B_S - C_S = -0\ 241$	$\Delta L - \rho$
1889		′			h m s	s	s			h m s	s	s	m s				
Dec 2	981	+ 39 12	N	I P W	3 4 28 15	−1 11	27 04	N	I P W	3 48 29 71	−1 64	28 07	44 1 03	m s 44 1 075	+ 0 210	− 0 241	44 1 044
	1006	+ 43 37	N	d c + 1 1	10 39 90	−0 91	38 99	N	d c − 1 4	54 41 79	−1 63	40 16	1 17				
	1017	+ 33 49	N	b − 3 1 a − 73 0	12 7 95	−1 31	6 64	N	b − 1 3 a − 4 4	56 9 35	−1 64	7 ,1	1 07				
	1025	+ 28 39	N	s Q − 1 49	13 58 10	−1 49	56 61	N	s Q − 1 59	57 59 29	−1 65	57 64	1 03				
	950	+ 3 55	S		2 56 54 70	−2 18	52 52	S		3 40 55 29	−1 69	53 60	44 1 08	m s 44 1 065	+ 0 210	− 0 241	44 1 034
	957	+ 24 50	S		59 16 77	−1 61	15 16	S		43 1, 92	−1 65	16 27	1 11				
	986	+ 19 19	S		3 5 37 74	−1 76	35 98	S		49 38 64	−1 66	36 98	1 00				
	991	+ 6 15	S		6 53 89	−2 12	51 77	S		50 54 52	−1 68	52 84	1 07				
Dec 3	861	+ 28 48	N	I P W	2 41 28 96	+1 50	30 46	N	I P E	3 25 29 78	+1 60	31 38	44 0 92	m s 44 0 888	+ 0 207	− 0 241	44 0 854
	877	+ 34 36	N	d c + 1 1	44 51 44	+1 67	53 11	N	d c − 0 2	28 52 46	+1 60	54 06	0 95				
	888	+ 37 53	N	b − 3 2 a − 67 1	46 53 26	+1 80	55 06	N	b 0 0 a − 0 6	30 54 39	+1 60	55 99	0 93				
	916	+ 40 36	N	s Q + 1 50	52 40 68	+1 90	42 58	N	s Q + 1 61	36 41 73	+1 60	43 33	0 75				
	852	+ 4 15	S		2 39 42 81	+0 86	43 67	S		3 23 43 05	+1 61	44 66	44 0 99	m s 44 0 945	+ 0 207	− 0 241	44 0 911
	867	+ 17 50	S		42 29 70	+1 21	30 91	S		26 30 29	+1 61	31 90	0 99				
	906	+ 7 56	S		50 28 71	+0 95	29 66	S		34 28 97	+1 61	30 58	0 92				
	929	+ 8 28	S		53 5, 13	+0 96	58 09	S		37 57 36	+1 61	58 97	0 88				
	981	+ 39 12	N	s Q − 1 50	3 4 21 49	−1 16	20 33	N	s Q − 1 61	3 48 22 84	−1 62	21 22	44 0 89	m s 44 0 985	+ 0 207	− 0 241	44 0 951
	1006	+ 43 37	N		10 33 26	−0 98	32 28	N		54 34 92	−1 61	33 31	1 03				
	1017	+ 33 49	N		11 61 25	−1 35	59 90	N		56 2 51	−1 62	0 89	0 99				
	1025	+ 28 39	N		13 51 28	−1 50	49 78	N		57 52 43	−1 62	50 81	1 03				
	950	+ 3 55	S		2 56 47 81	−2 15	45 66	S		3 40 48 32	−1 61	46 71	44 1 05	m s 44 1 053	+ 0 207	− 0 241	44 1 019
	957	+ 24 50	S		59 9 99	−1 62	8 37	S		43 11 03	−1 61	9 42	1 05				
	986	+ 19 19	S		3 5 30 95	−1 76	29 19	S		49 31 78	−1 61	30 17	0 98				
	991	+ 6 15	S		6 47 00	−2 09	44 91	S		50 47 65	−1 61	46 04	1 13				

OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL − ρ

AGRA (E) *Lat* 27° 10 *Long* 5h 12m 14s ; AND KARACHI (W) *Lat* 24° 51 , *Long* 4h 28m 18s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	In strumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Star's Aspect	In strumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl. Equations $B_N - C_N = -0.241$, $B_S - C_S = -0.241$	ΔL − ρ
1889		°			h m s	s	s			h m s	s	s	m s				
Dec 4	861	+ 28 48	N	*I P E*	2 41 22 44	+ 1 43	23 87	N	*I P E*	3 25 24 63	− 0 04*	24 59	44 0 72				
	877	+ 34 36	N	d c − 2 ,	44 45 05	+ 1 54	46 59	N	d c − 0 2	28 45 68	+ 1 61	47 29	0 70	m s 44 0 723	+ 0 206	− 0 241	44 0 688
	888	+ 37 53	N	b − 3 0 a − 38 9	46 46 85	+ 1 60	48 45	N	b − 2 4 a − 17 5	30 47 58	+ 1 63	49 21	0 76				
	916	+ 40 36	N	Q + 1 55 s	52 34 23	+ 1 64	35 87	N	Q + 1 60 s	36 34 92	+ 1 66	36 58	0 71				
	862	+ 4 15	S		2 39 36 04	+ 1 09	3, 13	S		3 23 38 11	− 0 19*	37 92	44 0 ,9				
	867	+ 17 50	S		42 23 02	+ 1 27	24 29	S		26 25 20	− 0 11*	25 09	0 80	m s 44 0 ,63	+ 0 206	− 0 241	44 0 728
	905	+ 7 56	S		50 21 92	+ 1 14	23 06	S		34 22 36	+ 1 43	23 ,9	0 73				
	929	+ 8 28	S		53 50 33	+ 1 15	51 48	S		37 50 77	+ 1 44	52 21	0 73				
	981	+ 39 12	N	Q − 1 55 s	3 4 15 19	− 1 48	13 71	N	Q − 1 60 s	3 48 15 99	− 1 5,	14 44	44 0 73				
	1006	+ 43 37	N		10 27 10	− 1 38	25 72	N		54 27 98	− 1 51	26 47	0 75	m s 44 0 ,35	+ 0 206	− 0 241	44 0 700
	1017	+ 33 49	N		11 54 91	− 1 58	53 33	N		55 55 70	− 1 60	54 10	0 77				
	1025	+ 28 39	N		13 44 92	− 1 67	43 25	N		57 45 58	− 1 64	43 94	0 69				
	950	+ 3 55	S		2 56 41 15	− 2 02	39 13	S		3 40 41 68	− 1 ,9	39 89	44 0 ,6				
	957	+ 24 50	S		59 3 57	− 1 73	1 84	S		43 4 26	− 1 66	2 60	0 ,6	m s 44 0 ,75	+ 0 206	− 0 241	44 0 740
	986	+ 19 19	S		3 5 24 39	− 1 80	22 59	S		49 25 01	− 1 70	23 31	0 72				
	991	+ 6 15	S		6 40 32	− 1 98	38 34	S		50 40 98	− 1 78	39 20	0 86				
							s										
Dec 5	861	+ 28 48	N	*I P E*	2 41 15 92	+ 1 36	17 28	N	*I P E*	3 25 16 49	+ 1 50	17 99	44 0 71				
	877	+ 34 36	N	d c − 2 7	44 38 47	+ 1 46	39 93	N	d c − 0 2	28 38 99	+ 1 54	40 53	0 60	m s 44 0 6,8	+ 0 209	− 0 241	44 0 646
	888	+ 37 53	N	b − 3 0 a − 34 9	46 40 33	+ 1 51	41 84	N	b − 4 2 a − 15 6	30 41 00	+ 1 56	42 56	0 72				
	916	+ 40 36	N	Q + 1 49 s	52 27 56	+ 1 56	29 12	N	Q + 1 59 s	36 28 22	+ 1 58	29 80	0 68				
	852	+ 4 15	S		2 39 29 39	+ 1 06	30 45	S		3 23 29 80	+ 1 38	31 18	44 0 73				
	867	+ 17 50	S		42 16 41	+ 1 23	17 64	S		26 16 88	+ 1 44	18 32	0 68	m s 44 0 745	+ 0 209	− 0 241	44 0 713
	905	+ 7 56	S		50 15 22	+ 1 11	16 33	S		34 15 74	+ 1 40	17 14	0 81				
	929	+ 8 28	S		53 43 56	+ 1 12	44 68	S		37 44 04	+ 1 40	45 44	0 76				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AGRA (E) *Lat* 27° 10′, *Long* $5^h\ 12^m\ 14^s$ AND KARACHI (W) *Lat* 24° 51′ *Long* $4^h\ 28^m\ 18^s$

Astronomical Date	Star		Transits Observed at E — *By Burrard with Telescope No 1*					Transits Observed at W — *By Lenox Conyngham with Telescope No 2*					Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns for Persl Equations $B_E - C_E = -0\ 241$, $B_S - C_S = -0\ 241$	$\Delta L - \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1889					h m s	s	s			h m s	s	s	m s				
Dec 5	981	+ 39 12	N	*I P E*	3 4 8 37	−1 44	6 93	N	*I P E*	3 48 9 29	−1 61	7 68	44 0 75	m s 44 0 750	+ 0 209	− 0 241	44 0 718
	1006	+ 43 37	N	d c − 2 7	10 20 28	−1 36	18 92	N	d c − 0 2	54 21 28	−1 57	19 71	0 79				
	1017	+ 33 49	N	b − 3 0 a −34 9	11 48 12	−1 53	46 59	N	b − 4 2 a −15 6	55 48 99	−1 64	47 35	0 76				
	1025	+ 28 39	N	s Q − 1 49	13 38 12	−1 62	36 50	N	s Q − 1 59	57 38 88	−1 68	37 20	0 70				
	950	+ 3 55	S		2 56 34 31	−1 92	32 39	S		3 40 35 01	−1 81	33 24	44 0 85	m s 44 0 758	+ 0 209	− 0 241	44 0 726
	957	+ 24 50	S		58 56 79	−1 66	55 13	S		42 57 52	−1 69	55 83	0 70				
	986	+ 19 19	S		3 5 17 53	−1 73	15 80	S		49 18 30	−1 73	16 57	0 77				
	991	+ 6 15	S		6 33 53	−1 89	31 64	S		50 34 14	−1 79	32 35	0 71				
Dec 6	861	+ 28 48	N	*I P W*	2 41 8 61	+1 49	10 10	N	*I P W*	3 25 9 71	+1 51	11 22	44 1 12	m s 44 1 073	+ 0 212	− 0 241	44 1 044
	877	+ 34 36	N	d c + 1 1	44 31 19	+1 60	32 79	N	d c − 1 4	28 32 32	+1 53	33 85	1 06				
	888	+ 37 53	N	b − 2 2 a −40 2	46 33 02	+1 67	34 69	N	b − 2 5 a −11 9	30 34 15	+1 56	35 71	1 02				
	916	+ 40 36	N	s Q + 1 49	52 20 29	+1 73	22 02	N	s Q + 1 59	36 21 53	+1 58	23 11	1 09				
	852	+ 4 15	S		2 39 22 18	+1 11	23 29	S		3 23 23 00	+1 42	24 42	44 1 13	m s 44 1 110	+ 0 212	− 0 241	44 1 081
	867	+ 17 50	S		42 9 22	+1 32	10 54	S		26 10 11	+1 47	11 58	1 04				
	905	+ 7 56	S		50 8 03	+1 16	9 19	S		34 8 87	+1 43	10 30	1 11				
	929	+ 8 28	S		53 36 40	+1 17	37 57	S		37 37 30	+1 43	38 73	1 16				
	981	+ 39 12	N	s Q − 1 49	3 3 61 14	−1 28	59 86	N	s Q − 1 59	3 48 2 52	−1 61	0 91	44 1 05	m s 44 1 035	+ 0 212	− 0 241	44 1 006
	1006	+ 43 37	N		10 11 58	+0 31*	11 89	N		54 14 54	−1 58	12 96	1 07				
	1017	+ 33 49	N		11 39 43	+0 09*	39 52	N		55 42 11	−1 65	40 46	0 94				
	1025	+ 28 39	N		13 29 52	0 00*	29 52	N		57 32 27	−1 67	30 60	1 08				
	950	+ 3 55	S		2 56 27 07	−1 88	25 19	S		3 40 28 13	−1 77	26 36	44 1 17	m s 44 1 143	+ 0 212	− 0 241	44 1 114
	957	+ 24 50	S		58 49 55	−1 55	48 00	S		42 50 69	−1 68	49 01	1 01				
	986	+ 19 19	S		3 5 10 33	−1 64	8 69	S		49 11 49	−1 71	9 78	1 09				
	991	+ 6 15	S		6 26 26	−1 84	24 42	S		50 27 48	−1 76	25 72	1 30				

* Owing to the irregular rate of the Chronograph the Pers Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) Lat 27° 10′ Long 5h 12m 14 AND KARACHI (W) Lat 24° 51, Long 4h 28m 18s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham, with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl Equations $B_E - C_E = -0\ 241$, $B_S - C_S = -0\ 241$	$\Delta L + \rho$
1889					h m s	s	s			h m s	s	s	m s				
Dec 1	1320	+ 41 33	N	I P E	3 2, 38 ,6	+ 1 46	40 22	N	I P W	4 11 39 16	+ 2 38	41 54	44 1 32	m s 44 1 270	+ 0 027	− 0·241	44 1 056
	1326	+ 27 5	N	d c − 2 7	28 35 62	+ 1 30	36 92	N	d c − 1 4	12 36 52	+ 1 63	38 15	1 23				
	1339	+ 42 10	N	b − 4 5 a − 25 2	30 56 59	+ 1 47	58 06	N	b − 1 3 a − 99 5	14 56 92	+ 2 42	59 34	1 28				
	1364	+ 31 12	N	s Q + 1 48	34 6 42	+ 1 34	7 76	N	s Q + 1 60	18 7 19	+ 1 82	9 01	1 25				
	1298	+ 8 59	S		3 22 57 84	+ 1 14	58 98	S		4 6 59 31	+ 0 92	60 23	44 1 25	m s 44 1 305	+ 0 027	− 0 241	44 1 091
	1304	+ 8 37	S		24 34 04	+ 1 14	35 18	S		8 35 60	+ 0 91	36 51	1 33				
	1311	+ 20 19	S		25 49 1,	+ 1 24	50 41	S		9 50 38	+ 1 35	51 73	1 32				
	1350	+ 16 31	S		32 6 66	+ 1 21	7 87	S		16 7 99	+ 1 20	9 19	1 32				
	1414	+ 41 2	N	s Q − 1 48	3 44 7 16	− 1 51	5 65	N	s Q − 1 60	4 28 7 85	− 0 85	7 00	44 1 35	m s 44 1 315	+ 0 027	− 0 241	44 1 101
	1445	+ 43 9	N		50 9 15	− 1 48	7 67	N		34 9 73	− 0 72	9 01	1 34				
	1452	+ 32 40	N		51 44 ,7	− 1 60	43 17	N		35 45 77	− 1 31	44 46	1 29				
	1462	+ 28 28	N		53 59 68	− 1 64	58 04	N		37 60 83	− 1 51	59 32	1 28				
	1376	+ 18 56	S		3 37 14 80	− 1 74	13 06	S		4 21 16 38	− 1 90	14 48	44 1 42	m s 44 1 410	+ 0 027	− 0 241	44 1 196
	1388	+ 19 36	S		38 54 02	− 1 ,3	52 29	S		22 55 53	− 1 88	53 65	1 36				
	1402	+ 15 37	S		40 38 00	− 1 76	36 24	S		24 39 74	− 2 03	37 71	1 47				
	1406	+ 16 6	S		42 23 ,1	− 1 75	21 96	S		26 25 36	− 2 01	23 35	1 39				
Dec 2	1320	+ 41 33	N	I P W	3 27 37 24	+ 1 97	s 39 21	N	I P W	4 11 39 16	+ 1 55	40 71	44 1 50	m s 44 1 480	+ 0 030	− 0 241	44 1 269
	1326	+ 27 5	N	d c + 1 1	28 34 48	+ 1 44	35 92	N	d c − 1 4	12 35 83	+ 1 52	37 35	1 43				
	1339	+ 42 10	N	b − 3 1 a − 73 0	30 55 11	+ 2 00	57 11	N	b − 1 3 a − 4 4	14 57 06	+ 1 55	58 61	1 50				
	1364	+ 31 12	N	s Q + 1 49	34 5 15	+ 1 57	6 72	N	s Q + 1 59	18 6 68	+ 1 53	8 21	1 49				
	1298	+ 8 59	S		3 22 57 04	+ 0 92	57 96	S		4 6 57 96	+ 1 50	59 46	44 1 50	m s 44 1 470	+ 0 030	− 0 241	44 1 259
	1304	+ 8 37	S		24 33 37	+ 0 91	34 28	S		8 34 26	+ 1 50	35 76	1 48				
	1311	+ 20 19	S		25 48 23	+ 1 25	49 48	S		9 49 41	+ 1 52	50 93	1 45				
	1350	+ 16 31	S		32 5 79	+ 1 14	6 93	S		16 6 86	+ 1 52	8 38	1 45				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) *Lat* 27° 10′ *Long* 5ʰ 12ᵐ 14ˢ : AND KARACHI (W) *Lat* 24° 51 *Long* 4ʰ 28ᵐ 18ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Peral Equations $B_E - C_E = -0^s\ 241$, $B_S - C_S = -0\ 241$	$\Delta L + \rho$
1889		°			h m s	s	s			h m s	s	s	m s				
Dec 2	1414	+ 41 2	N	*I P W*	3 44 5 89	− 1 03	4 86	N	*I P W*	4 28 7 80	− 1 63	6 17	44 1 31	m s 44 1 408	+ 0 030	− 0 241	44 1 197
	1445	+ 43 9	N	d c + 1 1	50 7 64	− 0 94	6 70	N	d c − 1 4	34 9 79	− 1 63	8 16	1 46				
	1452	+ 32 40	N	b − 3 1 a − 73 0	51 43 58	− 1 35	42 23	N	b − 1 3 a − 4 4	35 45 29	− 1 64	43 65	1 42				
	1462	+ 28 28	N	s Q − 1 49	53 58 56	− 1 50	57 06	N	s Q − 1 59	37 60 15	− 1 65	58 50	1 44				
	1376	+ 18 56	S		3 37 13 91	− 1 78	12 13	S		4 21 15 31	− 1 66	13 65	44 1 52	m s 44 1 5 3	+ 0 030	− 0 241	44 1 342
	1388	+ 19 36	S		38 53 00	− 1 76	51 24	S		22 54 52	− 1 66	52 86	1 62				
	1402	+ 15 37	S		40 37 12	− 1 87	35 25	S		24 38 41	− 1 67	36 74	1 49				
	1406	+ 16 6	S		42 22 78	− 1 86	20 92	S		26 24 17	− 1 67	22 50	1 58				
Dec 3	1320	+ 41 33	N	*I P W*	3 27 36 22	+ 1 94	38 16	N	*I P E*	4 11 37 97	+ 1 61	39 58	44 1 42	m s 44 1 3 5	+ 0 027	− 0 241	44 1 161
	1326	+ 27 5	N	d c + 1 1	28 33 43	+ 1 45	34 88	N	d c − 0 2	12 34 55	+ 1 60	36 15	1 27				
	1339	+ 42 10	N	b − 3 2 a − 67 1	30 54 04	+ 1 96	56 00	N	b 0 0 a − 0 6	14 55 79	+ 1 61	57 40	1 40				
	1364	+ 31 12	N	s Q + 1 50	34 4 04	+ 1 57	5 61	N	s Q + 1 61	18 5 42	+ 1 60	7 02	1 41				
	1298	+ 8 59	S		3 22 56 00	+ 0 97	56 97	S		4 6 56 74	+ 1 61	58 35	44 1 38	m s 44 1 333	+ 0 027	− 0 241	44 1 119
	1304	+ 8 37	S		24 32 31	+ 0 97	33 28	S		8 33 00	+ 1 61	34 61	1 33				
	1311	+ 20 19	S		25 47 23	+ 1 26	48 49	S		9 48 13	+ 1 61	49 14	1 25				
	1350	+ 16 31	S		32 4 73	+ 1 17	5 90	S		16 5 66	+ 1 61	7 27	1 37				
	1414	+ 41 2	N	s Q − 1 50	3 44 4 84	− 1 08	3 76	N	s Q − 1 61	4 28 6 72	− 1 62	5 10	44 1 34	m s 44 1 418	+ 0 027	− 0 241	44 1 204
	1445	+ 43 9	N		50 6 69	− 1 00	5 69	N		34 8 73	− 1 61	7 12	1 43				
	1452	+ 32 40	N		51 42 53	− 1 38	41 15	N		35 44 19	− 1 62	42 57	1 42				
	1462	+ 28 28	N		53 57 47	− 1 51	55 96	N		37 59 06	− 1 62	57 44	1 48				
	1376	+ 18 56	S		3 37 12 93	− 1 78	11 15	S		4 21 14 13	− 1 61	12 52	44 1 37	m s 44 1 408	+ 0 027	− 0 241	44 1 194
	1388	+ 19 36	S		38 52 01	− 1 76	50 25	S		22 53 31	− 1 61	51 70	1 45				
	1402	+ 15 37	S		40 36 11	− 1 86	34 25	S		24 37 29	− 1 61	35 68	1 43				
	1406	+ 16 6	S		42 21 78	− 1 84	19 94	S		26 22 93	− 1 61	21 32	1 38				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) *Lat 27° 10′ Long 5h 12m 14s* : **AND KARACHI (W)** *Lat 24° 51′, Long 4h 28m 13s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl. Equations $B_N - C_N = -0.241$, $B_S - C_S = -0.241$	$\Delta L + \rho$
1889		°			h m s	s	s			h m s	s	s	m s				
Dec 4	1826	+ 27 5	N	I P E	3 28 32 97	+ 1 28	34 25	N	I P E	4 12 33 86	+ 1 55	35 41	44 1 16	m s = 44 1 227	+ 0 027	− 0 241	44 1 013
	1339	+ 42 10	N	d c − 2 7	30 53 83	+ 1 56	55 39	N	d c − 0 2	14 55 02	+ 1 68	56 70	1 31				
	1364	+ 31 12	N	b − 3 0 a − 38 9	34 3 70	+ 1 35	5 05	N	b − 2 4 a − 17 5	18 4 68	+ 1 58	6 26	1 21				
				s Q + 1 43					s Q + 1 60								
	1298	+ 8 59	S		3 22 55 32	+ 1 03	56 35	S		4 6 56 17	+ 1 44	57 61	44 1 26	m s = 44 1 260	+ 0 027	− 0 241	44 1 046
	1304	+ 8 37	S		24 31 52	+ 1 03	32 55	S		8 32 42	+ 1 44	33 86	1 31				
	1311	+ 20 19	S		25 46 57	+ 1 19	47 76	S		9 47 51	+ 1 51	49 02	1 26				
	1350	+ 16 31	S		32 4 15	+ 1 13	5 28	S		16 5 01	+ 1 48	6 49	1 21				
	1414	+ 41 2	N	s Q − 1 43	3 44 4 41	− 1 32	3 09	N	s Q − 1 60	4 28 5 85	− 1 53	4 32	44 1 23	m s = 44 1 148	+ 0 027	− 0 241	44 0 934
	1445	+ 43 9	N		50 6 36	− 1 27	5 09	N		34 7 79	− 1 51	6 28	1 19				
	1452	+ 32 40	N		51 42 10	− 1 48	40 62	N		35 43 30	− 1 61	41 69	1 07				
	1462	+ 28 28	N		53 57 10	− 1 56	55 54	N		37 58 28	− 1 64	56 64	1 10				
	1376	+ 18 56	S		3 37 12 29	− 1 69	10 60	S		4 21 13 38	− 1 70	11 68	44 1 08	m s = 44 1 160	+ 0 027	− 0 241	44 0 946
	1388	+ 19 36	S		38 51 43	− 1 68	49 75	S		22 52 64	− 1 70	50 94	1 19				
	1402	+ 15 37	S		40 35 45	− 1 74	33 71	S		24 36 63	− 1 72	34 91	1 20				
	1406	+ 16 6	S		42 21 17	− 1 74	19 43	S		26 22 32	− 1 72	20 60	1 17				
Dec 5	1820	+ 41 33	N	I P E	3 27 35 00	+ 1 58	36 58	N	I P E	4 11 35 97	+ 1 59	37 56	44 0 98	m s = 44 1 098	+ 0 039	− 0 241	44 0 896
	1826	+ 27 5	N	d c − 2 7	28 31 84	+ 1 34	33 18	N	d c − 0 2	12 32 81	+ 1 49	34 30	1 12				
	1339	+ 42 10	N	b − 3 0 a − 34 9	30 52 74	+ 1 59	54 33	N	b − 4 2 a − 15 6	14 53 95	+ 1 60	55 55	1 22				
	1864	+ 31 12	N	s Q + 1 49	34 2 67	+ 1 40	4 07	N	s Q + 1 59	18 3 62	+ 1 52	5 14	1 07				
	1298	+ 8 59	S		3 22 54 12	+ 1 12	55 24	S		4 6 55 04	+ 1 40	56 44	44 1 20	m s = 44 1 163	+ 0 039	− 0 241	44 0 961
	1304	+ 8 37	S		24 30 45	+ 1 12	31 57	S		8 31 30	+ 1 40	32 70	1 13				
	1311	+ 20 19	S		25 45 49	+ 1 26	46 75	S		9 46 40	+ 1 46	47 86	1 11				
	1850	+ 16 31	S		32 2 94	+ 1 21	4 15	S		16 3 92	+ 1 44	5 36	1 21				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) Lat 27° 10′, Long 5h 12m 14s AND KARACHI (W) Lat 24° 51′ Long 4h 28m 18s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl Equations $B_N - C_N = -0^s\ 241$, $B_S - C_S = -0\ 241$	$\Delta L + \rho$
1889		°			h m s	s	s			h m s	s	s	m s				
Dec 5	1414	+ 41 2	N	I P E	3 44 3 43	− 1 41	2 02	N	I P E	4 28 4 78	− 1 59	3 19	44 1 17				
	1445	+ 43 9	N	d c − 2 7	50 5 36	− 1 37	3 99	N	d c − 0 2	34 6 74	− 1 57	5 17	1 18	m s 44 1 143	+ 0 039	− 0 241	44 0 941
	1452	+ 32 40	N	b − 3 0 a − 34 9	51 41 09	− 1 55	39 54	N	b − 4 2 a − 15 6	35 42 22	− 1 65	40 57	1 03				
	1462	+ 28 28	N	s Q − 1 49	53 55 99	− 1 62	54 37	N	s Q − 1 59	37 57 25	− 1 69	55 56	1 19				
	1376	+ 18 56	S		3 37 11 12	− 1 74	9 38	S		4 21 12 35	− 1 73	10 62	44 1 24				
	1388	+ 19 36	S		38 50 29	− 1 73	48 56	S		22 51 60	− 1 72	49 88	1 32	m s 44 1 280	+ 0 039	− 0 241	44 1 078
	1402	+ 15 37	S		40 34 27	− 1 78	32 49	S		24 35 54	− 1 75	33 79	1 30				
	1406	+ 16 6	S		42 20 03	− 1 78	18 25	S		26 21 25	− 1 74	19 51	1 26				
Dec 6	1320	+ 41 33	N	I P W	3 27 33 13	+ 1 76	34 89	N	I P W	4 11 34 80	+ 1 58	36 38	44 1 49				
	1326	+ 27 5	N	d c + 1 1	28 30 08	+ 1 46	31 54	N	d c − 1 4	12 31 51	+ 1 50	33 01	1 47	m s 44 1 433	+ 0 044	− 0 241	44 1 236
	1339	+ 42 10	N	b − 2 2 a − 40 2	30 51 05	+ 1 77	52 82	N	b − 2 5 a − 11 9	14 52 62	+ 1 59	54 21	1 39				
	1364	+ 31 12	N	s Q + 1 49	34 0 90	+ 1 53	2 43	N	s Q + 1 59	18 2 29	+ 1 52	3 81	1 38				
	1298	+ 8 59	S		3 22 52 56	+ 1 17	53 73	S		4 6 53 69	+ 1 44	55 13	44 1 40				
	1304	+ 8 37	S		24 28 79	+ 1 17	29 96	S		8 29 96	+ 1 44	31 40	1 44	m s 44 1 420	+ 0 044	− 0 241	44 1 223
	1311	+ 20 19	S		25 43 84	+ 1 36	45 20	S		9 45 08	+ 1 48	46 56	1 36				
	1330	+ 16 31	S		32 1 21	+ 1 30	2 51	S		16 2 53	+ 1 46	3 99	1 48				
	1414	+ 41 2	N	s Q − 1 49	3 44 1 74	− 1 23	0 51	N	s Q − 1 59	4 28 3 46	− 1 60	1 86	44 1 35				
	1445	+ 43 9	N		50 3 66	− 1 18	2 48	N		34 5 45	− 1 59	3 86	1 38	m s 44 1 367	+ 0 044	− 0 241	44 1 170
	1452	+ 32 40	N		51 39 33	− 1 42	37 91	N		35 40 94	− 1 66	39 28	1 37				
	1376	+ 18 56	S		3 37 9 52	− 1 65	7 87	S		4 21 11 01	− 1 71	9 30	44 1 43				
	1388	+ 19 36	S		38 48 69	− 1 63	47 06	S		22 50 18	− 1 71	48 47	1 41	m s 44 1 430	+ 0 044	− 0 241	44 1 233
	1402	+ 15 37	S		40 32 70	− 1 70	31 00	S		24 34 12	− 1 72	32 40	1 40				
	1406	+ 16 6	S		42 18 36	− 1 69	16 67	S		26 19 87	− 1 72	18 15	1 48				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AGRA (E) *Lat 27° 10′ Long 5h 12m 14s* **AND KALIANPUR (W)** *Lat 24° 7′ Long 5h 10m 47s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $B_N - C_N = -0\ 241$, $B_S - C_S = -0\ 241$	$\Delta L - \rho$
1889		°			h m s	s	s			h m s	s	s	m s				
Dec 28	1709	+ 29 6	N	I P E	5 22 37 69	+ 1 40	39 09	N	I P W	5 24 4 66	+ 1 83	6 49	1 27 40	m s 1 27 405	0 000	− 0 241	1 27 164
	1723	+ 32 7	N	d c − 3 1	25 30 48	+ 1 43	31 91	N	d c + 1 9	26 57 46	+ 1 84	59 30	27 39				
	1746	+ 27 36	N	b − 3 7 a − 27 6	28 57 64	+ 1 39	59 03	N	b + 2 2 a − 4 1	30 24 63	+ 1 83	26 46	27 43				
	1772	+ 29 9	N	s Q + 1 55	32 15 03	+ 1 40	16 43	N	s Q + 1 71	33 42 00	+ 1 83	43 83	27 40				
	1695	+ 21 51	S		5 20 58 11	+ 1 33	59 44	S		5 22 25 00	+ 1 81	26 81	1 27 37	m s 1 27 405	0 000	− 0 241	1 27 164
	1714	+ 22 23	S		24 1 35	+ 1 32	2 67	S		25 29 98	+ 0 10*	30 08	27 41				
	1733	+ 20 24	S		27 2 87	+ 1 33	4 18	S		28 29 8	+ 1 80	31 58	27 40				
	1764	+ 16 58	S		30 3, 09	+ 1 28	38 37	S		32 5 ,3	+ 0 08*	5 81	27 44				
	1824	+ 39 30	N	s Q − 1 55	5 41 12 28	− 1 58	10 70	N	s Q − 1·71	5 42 39 68	− 1 56	38 12	1 27 42	m s 1 2, 348	0 000	− 0 241	1 27 107
	1837	+ 24 32	N		42 15 53	− 1 75	13 78	N		43 42 73	− 1 61	41 12	27 34				
	1845	+ 39 7	N		43 51 53	− 1 57	49 96	N		45 18 81	− 1 57	17 24	27 28				
	1857	+ 33 53	N		45 22 79	− 1 64	21 15	N		46 50 08	− 1 58	48 50	27 35				
	1792	+ 16 29	S		5 34 55 82	− 1 83	53 99	S		5 36 21 35	+ 0 08*	21 43	1 27 44	m s 1 27 413	0 000	− 0 241	1 27 172
	1801	+ 23 9	S		36 38 26	− 1 77	36 49	S		38 5 48	− 1 61	3 87	27 38				
	1808	+ 15 1	S		38 13 59	− 1 84	11 ,5	S		39 40 78	− 1 64	39 14	27 39				
	1816	+ 3 58	S		39 13 16	− 1 95	11 21	S		40 40 30	− 1 65	38 65	27 44				
							s						s				
Dec 29	1709	+ 29 6	N	I P W	5 22 37 05	+ 1 53	38 58	N	I P W	5 24 4 51	+ 1 71	6 22	1 27 64	m s 1 27 5 5	0 000	− 0 241	1 27 334
	1723	+ 32 7	N	d c + 1 5	25 29 91	+ 1 57	31 48	N	d c + 1 9	26 57 28	+ 1 73	59 01	27 53				
	1746	+ 27 36	N	b − 1 7 a − 26 7	28 57 14	+ 1 52	58 66	N	b + 3 3 a − 1 6	30 24 49	+ 1 71	26 20	27 54				
	1772	+ 29 9	N	s Q + 1 51	32 14 42	+ 1 53	15 95	N	s Q + 1 58	33 41 83	+ 1 71	43 54	27 59				
	1695	+ 21 51	S		5 20 57 38	+ 1 45	58 83	S		5 22 24 86	+ 1 71	26 57	1 27 74	m s 1 27 668	0 000	− 0 241	1 2, 427
	1714	+ 22 23	S		24 0 76	+ 1 46	2 22	S		25 28 12	+ 1 71	29 83	27 61				
	1733	+ 20 24	S		27 2 29	+ 1 44	3 73	S		28 29 73	+ 1 71	31 44	27',1				
	1764	+ 16 58	S		30 36 56	+ 1 40	37 96	S		32 3 87	+ 1 70	5 57	27 61				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AGRA (E) *Lat 27° 10′ Long 5ʰ 12ᵐ 14ˢ* AND KALIANPUR (W) *Lat 24° 7′, Long 5ʰ 10ᵐ 47ˢ*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl. Equations $B_N - C_N = -0.241$, $B_S - C_S = -0.241$	$\Delta L - \rho$
1889		°			h m s	s	s			h m s	s	s	m s	m s			
Dec 29	1824	+ 39 30	N	*I P W*	5 41 11 45	−1 35	10 10	N	*I P W*	5 42 39 30	−1 42	37 88	1 27 78	1 27 690	0 000	− 0 241	1 27 449
	1837	+ 24 32	N	d c + 1 5	42 14 76	−1 54	13 22	N	d c + 1 9	43 42 31	−1 45	40 86	27 64				
	1857	+ 33 53	N	b − 1 7, a − 26 7	45 21 99	−1 43	120 56	N	b + 3 3, a − 1 6	46 49 64	−1 43	48 21	27 65				
				Q − 1 51 s					Q − 1 58 s								
	1792	+ 16 29	S		5 34 55 18	−1 62	53 56	S		5 36 22 65	−1 46	21 19	1 27 63	1 27 638	0 000	− 0 241	1 27 397
	1801	+ 23 9	S		36 37 48	−1 56	35 92	S		38 5 09	−1 45	3 64	27 7				
	1808	+ 15 1	S		38 12 96	−1 65	11 31	S		39 40 36	−1 47	38 89	27 58				
	1816	+ 3 58	S		39 12 55	−1 76	10 79	S		40 39 89	−1 48	38 41	27 62				
Dec 30	1709	+ 29 6	N	*I P W*	5 22 36 81	+1 42	38 23	N	*I P E*	5 24 4 42	+1 50	5 92	1 27 69	1 27 658	0 000	− 0 241	1 27 417
	1723	+ 32 7	N	d c + 1 5	25 29 01	+1 42	31 03	N	d c − 3 5	26 57 10	+1 58	58 68	27 65				
	1746	+ 27 36	N	b − 4 5, a − 1 8	28 56 80	+1 43	58 23	N	b − 3 0, a − 50 3	30 24 41	+1 47	25 88	27 65				
	1772	+ 29 9	N	Q + 1 50 s	32 14 16	+1 42	15 58	N	Q + 1 56 s	33 41 71	+1 51	43 22	27 64				
	1695	+ 21 51	S		5 20 57 1	+1 43	58 56	S		5 22 24 87	+1 36	26 23	1 27 67	1 27 653	0 000	− 0 241	1 27 412
	1714	+ 22 23	S		24 0 39	+1 43	1 82	S		25 28 09	+1 37	29 46	27 64				
	1733	+ 20 24	S		27 1 96	+1 42	3 38	S		28 29 71	+1 33	31 04	27 66				
	1764	+ 16 58	S		30 36 17	+1 43	37 60	S		32 3 98	+1 26	5 24	27 64				
	1824	+ 39 30	N	Q − 1 50 s	5 41 11 43	−1 58	9 85	N	Q − 1 56 s	5 42 38 94	−1 35	37 59	1 27 74	1 27 658	0 000	− 0 241	1 27 417
	1837	+ 24 32	N		42 14 48	−1 57	12 91	N		43 42 26	−1 71	40 55	27 64				
	1845	+ 39 7	N		43 50 65	−1 58	49 07	N		45 18 04	−1 36	16 68	27 61				
	1857	+ 33 53	N		45 21 81	−1 57	20 24	N		46 49 38	−1 50	47 88	27 64				
	1801	+ 23 9	S		5 36 37 27	−1 57	35 70	S		5 38 5 03	−1 74	3 29	1 27 59	1 27 603	0 000	− 0 241	1 27 362
	1808	+ 15 1	S		38 12 49	−1 58	10 91	S		39 40 42	−1 90	38 52	27 61				
	1816	+ 3 58	S		39 12 09	−1 58	10 51	S		40 40 21	−2 09	38 12	27 61				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AGRA (E) *Lat 27° 10′ Long 5h 12m 14* **AND KALIANPUR (W)** *Lat 24° 7′ Long 5h 10m 47s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $B_N - C_N = -0\ 241$, $B_S - C_S = -0\ 241$	$\Delta L - \rho$
1889					h m s	s	s			h m s	s	s	m s	m s			
Dec 31	1709	+ 29 6	N	*I P W*	5 22 36 40	+1 55	37 95	N	*I P E*	5 24 4 11	+1 50	5 61	1 27 66	1 27 648	0 000	− 0 241	1 27 407
	1723	+ 32 7	N	d c + 1 5	25 29 24	+1 55	30 79	N	d c − 3 5	26 56 85	+1 56	58 41	27 61				
	1746	+ 27 36	N	b + 0 3 a − 6 5	28 56 41	+1 54	57 95	N	b − 3 2 a −44 2	30 24 16	+1 47	25 63	27 68				
	1772	+ 29 9	N	s Q + 1 49	32 13 79	+1 55	15 34	N	s Q + 1 57	33 41 47	+1 50	42 97	27 63				
	1695	+ 21 51	S		5 20 56 76	+1 53	58 29	S		5 22 24 59	+1 37	25 96	1 27 67	1 27 650	0 000	− 0 241	1 27 409
	1714	+ 22 23	S		24 0 00	+1 53	1 53	S		25 27 81	+1 38	29 19	27 66				
	1733	+ 20 24	S		27 1 60	+1 52	3 12	S		28 29 38	+1 34	30 72	27 60				
	1764	+ 16 58	S		30 35 78	+1 51	37 29	S		32 3 67	+1 29	4 96	27 67				
	1824	+ 39 30	N	s Q − 1 49	5 41 10 91	−1 40	9 51	N	s Q − 1 57	5 42 38 59	−1 42	37 17	1 27 66	1 27 618	0 000	− 0 241	1 27 377
	1837	+ 24 32	N		42 14 01	−1 45	12 56	N		43 41 90	−1 73	40 17	27 61				
	1845	+ 39 ,	N		43 50 11	−1 40	48 71	N		45 17 73	−1 43	16 30	27 59				
	1857	+ 33 53	N		45 21 34	−1 42	19 92	N		46 49 08	−1 55	47 53	27 61				
	1702	+ 16 29	S		5 34 54 27	−1 47	52 80	S		5 6 22 35	−1 86	20 49	1 27 69	1 27 680	0 000	− 0 241	1 27 439
	1801	+ 23 9	S		36 36 73	−1 45	35 28	S		38 4 73	−1 76	2 97	27 69				
	1808	+ 15 1	S		38 12 04	−1 48	10 56	S		39 40 10	−1 88	38 22	27 66				
	1816	+ 3 58	S		39 11 59	−1 51	18 08	S		40 39 82	−2 06	37 76	27 68				
1890																	
Jan 1	1709	+ 29 6	N	*I P E*	5 22 36 60	+1 33	37 93	N	*I P E*	5 24 3 76	+1 51	5 27	1 27 34	1 27 375	0 000	− 0 241	1 27 134
	1728	+ 32 7	N	d c − 3 1	25 29 30	+1 35	30 65	N	d c − 3 5	26 56 52	+1 57	58 09	27 44				
	1746	+ 27 36	N	b − 3 4 a −19 0	28 56 58	+1 31	57 89	N	b − 3 1 a −40 9	30 23 75	+1 48	25 23	27 34				
	1772	+ 29 9	N	s Q + 1 48	32 13 86	+1 33	15 19	N	s Q + 1 59	33 41 06	+1 51	42 57	27 38				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

AGRA (E) *Lat 27° 10′ Long 5h 12m 14s*; AND KALIANPUR (W) *Lat 24° 7′ Long 5h 10m 47s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, *By Burrard with Telescope No 1*: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, *By Lenox Conyngham with Telescope No 2*: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Persl Equations $B_N - C_N = -0^s.241$, $B_S - C_S = -0.241$	$\Delta L - \rho$
1890		°			h m s	s	s			h m s	s	s	m s				
Jan 1	1695	+ 21 51	S	*I P E*	5 20 56 90	+ 1 29	58 19	S	*I P E*	5 22 24 22	+ 1 40	25 62	1 27 43	m s 1 27 373	0 000	− 0 241	1 27 132
	1714	+ 22 23	S	d c − 3 1	24 0 16	+ 1 28	1 44	S	d c − 3 5	25 27 44	+ 1 40	28 84	27 40				
	1783	+ 20 24	S	b − 3 4 a − 19 0	27 1 74	+ 1 28	3 02	S	b − 3 1 a − 40 9	28 29 00	+ 1 37	30 37	27 35				
	1764	+ 16 58	S	Q + 1s 48	30 36 04	+ 1 25	37 29	S	Q + 1s 59	32 3 28	+ 1 32	4 60	27 31				
	1824	+ 39 30	N	Q − 1s 48	5 41 10 99	− 1 55	9 44	N	Q − 1s 59	5 42 38 31	− 1 47	36 84	1 27 40	m s 1 27 375	0 000	− 0 241	1 27 134
	1837	+ 24 32	N		42 14 14	− 1 66	12 48	N		43 41 52	− 1 75	39 77	27 29				
	1845	+ 39 [illegible]	N		43 50 19	− 1 56	48 63	N		45 17 46	− 1 47	15 99	27 36				
	1857	+ 33 53	N		45 21 38	− 1 59	19 79	N		46 48 81	− 1 57	47 24	27 45				
	1792	+ 16 29	S		5 34 54 47	− 1 71	52 76	S		5 36 21 97	− 1 87	20 10	1 27 34	m s 1 27 370	0 000	− 0 241	1 27 129
	1801	+ 23 9	S		36 36 91	− 1 67	35 24	S		38 4 37	− 1 78	2 59	27 35				
	1808	+ 15 1	S		38 12 21	− 1 72	10 49	S		39 39 71	− 1 89	37 82	27 33				
	1816	+ 3 58	S		39 11 77	− 1 79	9 98	S		40 39 49	− 2 05	37 44	27 46				
Jan 2	1857	+ 33 53	N	*I P E* d c − 3 1 b − 3 9 a − 7 3 Q + 1s 47	5 45 18 16	+ 1 31	19 47	N	*I P W* d c + 1 9 b + 1 8 a − 29 0 Q − 1s 60	5 46 48 12	− 1 37	46 75	1 27 28	m s 1 27 280	0 000	− 0 241	1 27 039
	1801	+ 23 9	S		5 36 33 57	+ 1 28	34 85	S		5 38 3 76	− 1 82	2 24	1 27 39	m s 1 27 390	0 000	− 0 241	1 27 149

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$.

AGRA (E) *Lat* 27° 10′, *Long* 5h 12m 14s AND KALIANPUR (W) *Lat* 24° 7′, *Long* 5h 10m 47s																	
Astronomical Date	Star		Transits Observed at E — *By Burrard, with Telescope No 1*					Transits Observed at W — *By Lenox Conyngham, with Telescope No 2*					Difference of Corrected Times (W − E)		Correction for Rate of W Clock	Corrns for Persl Equations $B_W - C_X = -0^s.241$, $B_S - C_S = -0.241$	$\Delta L + \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1889		°			h m s	s	s			h m s	s	s	m s	m s			
Dec 28	1935	+ 37 58	N	*I P E*	5 55 37 73	+ 1 51	39 24	N	*I P W*	5 57 6 52	+ 0 14*	6 66	1 27 42	1 27 438	+ 0 001	− 0 241	1 27 198
	1942	+ 38 30	N	d c − 3 1	57 7 98	+ 1 51	9 49	N	d c + 1 9	58 36 78	+ 0 14*	36 92	27 43				
	1947	+ 38 6	N	b − 3 7 a − 27 6	58 6 07	+ 1 51	7 58	N	b + 2 2 a − 4 1	59 33 17	+ 1 85	35 02	27 44				
	2021	+ 35 15	N	s Q + 1 55	6 9 39 98	+ 1 48	41 46	N	s Q + 1 71	6 11 7 08	+ 1 84	8 92	27 46				
	1958	+ 14 47	S		5 59 25 39	+ 1 26	26 65	S		6 0 52 26	+ 1 78	54 04	1 27 39	1 27 468	+ 0 001	− 0 241	1 27 228
	1971	+ 23 8	S		6 1 11 05	+ 1 33	12 38	S		2 38 11	+ 1 81	39 92	27 54				
	1975	+ 23 1	S		1 57 38	+ 1 33	58 71	S		3 24 34	+ 1 81	26 15	27 44				
	2029	+ 23 19	S		10 49 11	+ 1 34	50 45	S		12 16 14	+ 1 81	17 95	27 50				
	2058	+ 25 6	N	s Q − 1 55	6 16 8 13	− 1 74	6 39	N	s Q − 1 71	6 17 35 57	− 1 61	33 96	1 27 57	1 27 578	+ 0 001	− 0 241	1 27 338
	2082	+ 30 34	N		19 40 83	− 1 69	39 14	N		21 8 26	− 1 59	6 67	27 53				
	2097	+ 28 17	N		21 36 42	− 1 71	34 71	N		23 3 88	− 1 59	2 29	27 58				
	2110	+ 32 32	N		23 27 31	− 1 66	25 65	N		24 54 86	− 1 58	53 28	27 63				
	2047	+ 22 34	S		6 14 29 31	− 1 77	27 54	S		6 15 56 65	− 1 61	55 04	1 27 50	1 27 563	+ 0 001	− 0 241	1 27 323
	2067	+ 21 42	S		17 17 54	− 1 77	15 77	S		18 44 92	− 1 61	43 31	27 54				
	2126	+ 7 25	S		25 8 35	− 1 91	6 44	S		26 35 69	− 1 65	34 04	27 60				
	2140	+ 16 18	S		26 44 11	− 1 82	42 29	S		28 11 53	− 1 63	9 90	27 61				
Dec 29	1935	+ 37 58	N	*I P W*	5 55 36 50	+ 1 64	38 14	N	*I P W*	5 57 4 11	+ 1 73	5 84	1 27 70	1 27 703	+ 0 001	− 0 241	1 27 463
	1942	+ 38 30	N	d c + 1 5	57 6 72	+ 1 65	8 37	N	d c + 1 9	58 34 33	+ 1 73	36 06	27 69				
	1947	+ 38 6	N	b − 1 7 a − 26 7	58 4 84	+ 1 64	6 48	N	b + 3 3 a − 1 6	59 32 47	+ 1 73	34 20	27 72				
	2021	+ 35 15	N	s Q + 1 51	6 9 38 85	+ 1 60	40 45	N	s Q + 1 58	6 11 6 42	+ 1 73	8 15	27 70				
	1958	+ 14 47	S		5 59 24 27	+ 1 37	25 64	S		6 0 51 65	+ 1 69	53 34	1 27 70	1 27 718	+ 0 001	− 0 241	1 27 478
	1971	+ 23 8	S		6 1 9 87	+ 1 46	11 33	S		2 37 36	+ 1 71	39 07	27 74				
	1975	+ 23 1	S		1 56 20	+ 1 46	57 66	S		3 33 73	+ 1 71	25 44	27 78				
	2029	+ 23 19	S		10 48 04	+ 1 47	49 51	S		12 15 45	+ 1 71	17 16	27 65				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) *Lat* 27° 10′, *Long* 5ʰ 12ᵐ 14ˢ; AND KALIANPUR (W) *Lat* 24° 7′, *Long* 5ʰ 10ᵐ 47ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox-Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl. Equations $B_E - C_E = -0^s.241$, $B_S - C_S = -0.241$	$\Delta L + \rho$
1889		° ′			h m s	s	s			h m s	s	s	m s				
Dec 29	2058	+ 25 6	N	*I P W*	6 16 6 89	−1 53	5 36	N	*I P W*	6 17 34 60	−1 45	33 15	1 27 79	m s 1 27 743	+ 0 001	− 0 241	1 27 503
	2082	+ 30 34	N	d c + 1 5	19 39 53	−1 47	38 06	N	d c + 1 9	21 7 25	−1 44	5 81	27 75				
	2097	+ 28 17	N	b − 1 7 a −26 7	21 35 26	−1 50	33 76	N	b + 3 3 a − 1 6	23 2 93	−1 45	1 48	27 [illegible]2				
	2110	+ 32 32	N	Q − 1 51 s	23 20 17	−1 44	24 73	N	Q − 1 58 s	24 53 87	−1 43	52 44	27 71				
	2047	+ 22 34	S		6 14 28 04	−1 56	26 48	S		6 15 55 67	−1 45	54 22	1 27 74	m s 1 27 728	+ 0 001	− 0 241	1 27 488
	2067	+ 21 42	S		17 16 31	−1 57	14 74	S		18 43 95	−1 45	42 50	27 76				
	2126	+ 7 25	S		25 7 29	−1 72	5 57	S		26 34 67	−1 48	33 19	27 62				
	2140	+ 16 18	S		26 42 96	−1 64	41 32	S		28 10 58	−1 47	9 11	27 79				
Dec 30	2021	+ 35 15	N	*I P W* d c + 1 5 b − 4 5 a − 1 8 Q + 1 50 s	6 9 37 91	+1 43	39 34	N	*I P E* d c − 3 5 b − 3 0 a −50 3 Q + 1 56 s	6 11 5 41	+1 65	7 06	1 27 72	m s 1 27 720	+ 0 001	− 0 241	1 27 480
	1968	+ 14 47	S		5 59 23 09	+1 42	24 51	S		6 0 51 03	+1 22	52 25	1 27 74	m s 1 27 758	+ 0 001	− 0 241	1 27 518
	1971	+ 23 8	S		6 1 8 78	+1 43	10 21	S		2 36 63	+1 38	38 01	27 80				
	1975	+ 23 1	S		1 55 15	+1 43	56 58	S		3 22 94	+1 37	24 31	27 73				
	2029	+ 23 19	S		10 46 94	+1 43	48 37	S		12 14 75	+1 38	16 13	27 76				
	2058	+ 25 6	N	Q − 1 50 s	6 16 5 86	−1 57	4 29	N	Q − 1 56 s	6 17 33 71	−1 70	32 01	1 27 72	m s 1 27 770	+ 0 001	− 0 241	1 27 530
	2082	+ 30 34	N		19 38 56	−1 58	36 98	N		21 6 35	−1 58	4 77	27 79				
	2097	+ 28 17	N		21 34 18	−1 57	32 61	N		23 2 02	−1 63	0 39	27 78				
	2110	+ 32 32	N		23 25 16	−1 58	23 58	N		24 52 90	−1 53	51 37	27 79				
	2047	+ 22 34	S		6 14 26 99	−1 57	25 42	S		6 15 54 86	−1 76	53 10	1 27 68	m s 1 27 747	+ 0 001	− 0 241	1 27 507
	2067	+ 21 42	S		17 15 15	−1 57	13 58	S		18 43 17	−1 76	41 41	27 83				
	2126	+ 7 25	S		25 5 98	−1 58	4 40	S		26 34 17	−2 04	32 13	27 73				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) *Lat* 27° 10′, *Long* 5ʰ 12ᵐ 14ˢ AND KALIANPUR (W) *Lat* 24° 7′, *Long* 5ʰ 10ᵐ 47ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl. Equations $B_W - C_W = -0^s 241$, $B_E - C_E = -0\ 241$	$\Delta L + \rho$
1889		°			h m s	s	s			h m s	s	s	m s	m s			
Dec 31	1930	+ 37 58	N	*I P W*	5 55 34 37	+1 57	35 94	N	*I P E*	5 57 2 01	+1 68	3 69	1 27 75	1 27 735	+ 0 001	− 0 241	1 27 495
	1942	+ 38 30	N	d c + 1 5	57 4 64	+1 58	6 22	N	d c − 3 5	58 32 24	+1 69	33 93	27 71				
	1947	+ 38 6	N	b + 0 3 a − 6 5	58 2 75	+1 58	4 33	N	b − 3 2 a −44 2	59 30 41	+1 68	32 09	27 76				
	2021	+ 35 15	N	s Q +1 49	6 9 36 71	+1 57	38 28	N	s Q +1 57	6 11 4 39	+1 61	*6 00	27 72				
	1958	+ 14 47	S		5 59 21 92	+1 50	23 42	S		6 0 49 91	+1 25	51 16	1 27 74	1 27 748	+ 0 001	− 0 241	1 27 508
	1971	+ 23 8	S		6 1 7 59	+1 53	9 12	S		2 35 51	+1 38	36·89	27 77				
	1975	+ 23 1	S		1 53 95	+1 53	55 48	S		3 21 84	+1 38	23 22	27 74				
	2029	+ 23 19	S		10 45 75	+1 53	47 28	S		12 13 63	+1 39	15 02	27 74				
	2058	+ 25 6	N	s Q − 1 49	6 16 4 59	−1 45	3 14	N	s Q −1 57	6 17 32 66	−1 72	30 94	1 27 80	1 27 785	+ 0 001	− 0 241	1 27 545
	2082	+ 30 34	N		19 37 31	−1 43	35 88	N		21 5 24	−1 61	3 63	27 75				
	2097	+ 28 17	N		21 32 96	−1 44	31 52	N		22 60 96	−1 66	59 30	27 78				
	2110	+ 32 32	N		23 23 88	−1 42	22 46	N		24 51 84	−1 57	50 27	27 81				
	2047	+ 22 34	S		6 14 25 71	−1 45	24 26	S		6 15 53 79	−1 77	52 02	1 27 76	1 27 758	+ 0 001	− 0 241	1 27 518
	2067	+ 21 42	S		17 13 97	−1 45	12 52	S		18 42 06	−1 77	40 29	27 77				
	2126	+ 7 25	S		25 4 74	−1 50	3 24	S		26 33,00	−2 01	30 99	27 75				
	2140	+ 16 18	S		26 40 57	−1 48	39 09	S		28 8 70	−1 86	6 84	27 75				
1890																	
Jan. 1	1935	+ 37 58	N	*I P E*	5 55 33 71	+1 40	35 11	N	*I P E*	5 57 2 48	+0 09*	2 57	1 27 46	1 27 465	+ 0 001	− 0 241	1 27 225
	1942	+ 38 30	N	d c − 3 1	57 3 92	+1 40	5 32	N	d c − 3 5	58 32 64	+0 10*	32 74	27 42				
	1947	+ 38 6	N	b − 3 4 a −19 0	58 2 01	+1 39	3 40	N	b − 3 1 a −40 9	59 30 79	+0 09*	30 88	27 48				
	2021	+ 35 15	N	s Q +1 48	6 9 35 96	+1 38	37 34	N	s Q +1 59	6 11 3 21	+1 63	4 84	27 50				
	1958	+ 14 47	S		5 59 21 20	+1 23	22 43	S		6 0 50 30	−0 31*	49 99	1 27 56	1 27 515	+ 0 001	− 0 241	1 27 275
	1971	+ 23 8	S		6 1 6 94	+1 29	8 23	S		2 35 95	−0 19*	35 76	27 53				
	1975	+ 23 1	S		1 53 26	+1 29	54 55	S		3 22 29	−0 19*	22 10	27 55				
	2029	+ 23 19	S		10 45 14	+1 29	46 43	S		12 12 44	+1 41	13 85	27 42				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

AGRA (E) *Lat 27° 10′, Long 5ʰ 12ᵐ 14ˢ;* AND KALIANPUR (W) *Lat 24 7′, Long 5ʰ 10ᵐ 47ˢ*

Astronomical Date	Star: B A C Number	Star: Declination	E: Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	W: Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Difference of Corrected Times (W − E): Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $B_E - C_E = -0^s\ 241$, $B_W - C_W = -0\ 241$	$\Delta L + \rho$
		Transits Observed at E — *By Burrard, with Telescope No 1*						**Transits Observed at W** — *By Lenox Conyngham, with Telescope No 2*									
1890		°			h m s	s	s			h m s	s	s	m s				
Jan 1	2056	+ 25 6	N	*I P E*	6 16 3 90	−1 66	2 24	N	*I P E*	6 17 31 50	−1 74	29 76	1 27 52	m s 1 27 445	+ 0 001	− 0 241	1 27 205
	2082	+ 30 34	N	d o − 3 1	19 36 57	−1 62	34 95	N	d o − 3 5	21 4 04	−1 64	2 40	27 45				
	2097	+ 28 17	N	b − 3 4, a − 19 0	21 32 26	−1 64	30 62	N	b − 3 1, a − 40 9	22 59 73	−1 68	58 05	27 43				
	2110	+ 32 32	N	Q − 1 48	23 23 25	−1 60	21 65	N	Q − 1 59	24 50 63	−1 60	49 03	27 38				
	2047	+ 22 34	S		6 14 25 01	−1 68	23 33	S		6 15 52 64	−1 79	50 85	1 27 52	m s 1 27 493	+ 0 001	− 0 241	1 2, 253
	2067	+ 21 42	S		17 13 28	−1 67	11 61	S		18 40 89	−1 78	39 11	2, 50				
	2126	+ 7 25	S		25 4 13	−1 76	2 37	S		26 31 79	−2 01	29 78	27 41				
	2140	+ 16 18	S		26 39 92	−1 71	38 21	S		28 7 62	−1 87	5 75	27 54				
Jan. 2	1985	+ 37 58	N	*I P E*	5 55 31 97	+1 31	33 28	N	*I P W*	5 56 58 96	+1 91	60 87	1 27 59	m s 1 27 470	+ 0 002	− 0 241	1 27 231
	1942	+ 38 30	N	d o − 3 1	57 2 28	+1 31	3 59	N	d o + 1 9	58 29 15	+1 91	31 06	27 47				
	1947	+ 38 6	N	b − 3 9, a − 7 3	58 0 37	+1 31	1 68	N	b + 1 8, a − 29 0	59 27 32	+1 90	29 22	27 54				
	2021	+ 35 15	N	Q + 1 47	6 9 34 44	+1 31	35 75	N	Q + 1 60	6 11 1 18	+1 85	3 03	27 28				
	1958	+ 14 47	S		5 59 19 54	+1 27	20 81	S		6 0 46 69	+1 57	48 26	1 27 45	m s 1 27 470	+ 0 002	− 0 241	1 27 231
	1971	+ 23 8	S		6 1 5 21	+1 28	6 49	S		2 32 34	+1 68	34 02	27 53				
	1975	+ 23 1	S		1 51 61	+1 29	52 90	S		3 18 70	+1 68	20 38	27 48				
	2029	+ 23 19	S		10 43 43	+1 28	44 71	S		12 10 45	+1 68	12 13	27 42				
	2058	+ 25 6	N	Q − 1 47	6 16 2 22	−1 66	0 56	N	Q − 1 60	6 17 29 51	−1 50	28 01	1 27 45	m s 1 27 483	+ 0 002	− 0 241	1 27 244
	2082	+ 30 34	N		19 34 96	−1 64	33 32	N		21 2 17	−1 42	0 75	27 43				
	2097	+ 28 17	N		21 30 53	−1 65	28 88	N		22 57 90	−1 44	56 46	27 58				
	2110	+ 32 32	N		23 21 52	−1 63	19 89	N		24 48 75	−1 39	47 36	27 47				
	2047	+ 22 34	S		6 14 23 3,	−1 65	21 72	S		6 15 50 69	−1 53	49 16	1 27 44	m s 1 27 463	+ 0 002	− 0 241	1 27 224
	2067	+ 21 42	S		17 11 62	−1 65	9 97	S		18 38 99	−1 54	37 45	27 48				
	2126	+ 7 25	S		25 2 40	−1 68	0 72	S		26 29 87	−1 71	28 16	27 44				
	2140	+ 16 18	S		26 38 21	−1 66	36 55	S		28 5 65	−1 61	4 04	27 49				

KALIANPUR (E) *Lat* 24° 7′, *Long* 5ʰ 10ᵐ 47ˢ; AND BOMBAY (W) *Lat* 18° 54′, *Long* 4ʰ 51ᵐ 25ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham, with Telescope No 2): Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By Burrard, with Telescope No 1): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	(W − E): Mean of Group	Correction for Rate of E Clock	Corrns. for Persl Equations $C_E - B_E = +0^s.241$, $C_S - B_S = +0.241$	ΔL − ρ
		°			h m s	s	s			h m s	s	s	m s				
1890 Jan 15	2237	+ 34 6	N	I P W	6 45 39 40	+ 1 70	41 10	N	I P E	7 5 2 09	+ 0 06	2 15	19 21 05				
	2278	+ 26 4	N	d c − 1 8	52 47 59	+ 1 58	49 17	N	d c + 0 1	12 10 14	+ 0 04	10 18	21 01	m s 19 21 038	+ 0 010	+ 0 241	19 21 289
	2287	+ 29 22	N	b − 0 6 a − 35 2	54 21 83	+ 1 61	23 44	N	b + 1 3 a − 4 8	13 44 48	+ 0 05	44 53	21 09				
	2299	+ 24 22	N	s Q + 1 60	55 49 82	+ 1 55	51 37	N	s Q 0 00	15 12 33	+ 0 04	12 37	21 00				
	2216	+ 8 9	S		6 41 28 82	+ 1 33	30 15	S		7 0 51 26	+ 0 01	51 27	19 21 12				
	2228	+ 16 20	S		43 37 23	+ 1 44	38 67	S		2 59 68	+ 0 03	59 71	21 04	m s 19 21 040	+ 0 010	+ 0 241	19 21 291
	2306	+ 11 7	S		57 39 75	+ 1 37	41 12	S		17 2 05	+ 0 02	2 07	20 95				
	2322	+ 9 21	S		59 44 95	+ 1 35	46 30	S		19 7 34	+ 0 01	7 35	21 05				
	2331	+ 30 19	N	s Q − 1 60	7 2 29 06	− 1 57	27 49	N	s Q 0 00	7 21 48 41	+ 0 05	48 46	19 20 97				
	2340	+ 30 26	N		4 18 57	− 1 57	17 00	N		23 38 05	+ 0 05	38 10	21 10	m s 19 21 053	+ 0 010	+ 0 241	19 21 304
	2350	+ 24 19	N		5 55 76	− 1 65	54 11	N		25 15 13	+ 0 04	15 17	21 06				
	2383	+ 26 53	N		10 24 84	− 1 63	23 21	N		29 44 24	+ 0 05	44 29	21 08				
	2362	+ 16 21	S		7 7 13 78	− 1 76	12 02	S		7 26 32 98	+ 0 03	33 01	19 20 99				
	2373	+ 3 18	S		8 44 97	− 1 93	43 04	S		28 3 98	0 00	3 98	20 94	m s 19 20 975	+ 0 010	+ 0 241	19 21 226
	2398	+ 16 44	S		11 56 79	− 1 76	55 03	S		31 16 00	+ 0 03	16 03	21 00				
	2410	+ 22 11	S		13 43 67	− 1 68	41 99	S		33 2 92	+ 0 04	2 96	20 97				
Jan 17	2237	+ 34 6	N	I P W	6 45 37 82	+ 1 75	39 57	N	L P W	7 4 59 24	+ 1 44	60 68	19 21 11				
	2278	+ 26 4	N	d c − 1 8	52 45 94	+ 1 64	47 58	N	d c − 1 7	12 7 39	+ 1 42	8 81	21 23	m s 19 21 180	+ 0 008	+ 0 241	19 21 429
	2287	+ 29 22	N	b − 1 5 a − 28 9	54 20 25	+ 1 68	21 93	N	b + 1 3 a − 8 7	13 41 70	+ 1 43	43 13	21 20				
	2299	+ 24 22	N	s Q + 1 70	55 48 21	+ 1 62	49 83	N	s Q + 1 40	15 9 60	+ 1 41	11 01	21 18				
	2216	+ 8 9	S		6 41 27 25	+ 1 45	28 70	S		7 0 48 35	+ 1 35	49 70	19 21 00				
	2228	+ 16 20	S		43 35 59	+ 1 54	37 13	S		2 56 80	+ 1 38	58 18	21 05	m s 19 21 075	+ 0 008	+ 0 241	19 21 324
	2306	+ 11 7	S		57 38 09	+ 1 48	39 57	S		16 59 30	+ 1 36	60 66	21 09				
	2322	+ 9 21	S		59 43 31	+ 1 46	44 77	S		19 4 57	+ 1 36	5 93	21 16				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

KALIANPUR (E) *Lat* 24° 7′, *Long* 5h 10m 47s ; AND BOMBAY (W) *Lat* 18° 54′, *Long* 4h 51m 25s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham, with Telescope No 2): Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By Burrard, with Telescope No 1): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Difference of Corrected Times (W − E): Mean of Group	Correction for Rate of E Clock	Corrns for Persl. Equations $C_E - B_E = + 0.241$, $C_S - B_S = + 0.241$	$\Delta L - \rho$
1890		° ′			h m s	s	s			h m s	s	s	m s				
Jan 17	2331	+ 30 19	N	I P W d c − 1 8 b − 1 5 a − 28 9 s Q − 1 70	7 2 27 69	− 1 71	25 98	N	I P W d c − 1 7 b + 1 3 a − 8 7 s Q − 1 40	7 21 48 52	− 1 37	47 15	19 21 17	m s 19 21 103	+ 0 008	+ 0 241	19 21 352
	2340	+ 30 26	N		4 17 32	− 1 71	15 61	N		23 38 06	− 1 36	36 70	21 09				
	2350	+ 24 19	N		5 54 42	− 1 78	52 64	N		25 15 08	− 1 39	13 69	21 05				
	2362	+ 16 21	S		7 7 12 41	− 1 86	10 55	S		7 26 33 03	− 1 42	31 61	19 21 06	m s 19 21 065	+ 0 008	+ 0 241	19 21 314
	2373	+ 3 18	S		8 43 54	− 2 00	41 54	S		28 4 06	− 1 46	2 60	21 06				
	2398	+ 16 44	S		11 55 38	− 1 86	53 52	S		31 15 98	− 1 42	14 56	21 04				
	2410	+ 22 11	S		13 42 27	− 1 80	40 47	S		33 2 97	− 1 40	1 57	21 10				
Jan 18	2237	+ 34 6	N	I P E d c + 0 2 b + 0 2 a + 58 2 s Q + 1 70	6 45 37 59	+ 1 45	39 04	N	I P W d c − 1 7 b + 1 2 a − 14 6 s Q + 1 40	7 4 58 69	+ 1 48	60 17	19 21 13	m s 19 21 188	+ 0 008	+ 0 241	19 21 437
	2278	+ 26 4	N		52 45 46	+ 1 65	47 11	N		12 6 89	+ 1 44	8 33	21 22				
	2287	+ 29 22	N		54 19 85	+ 1 58	21 43	N		13 41 15	+ 1 46	42 61	21 18				
	2299	+ 24 22	N		55 47 59	+ 1 69	49 28	N		15 9 08	+ 1 42	10 50	21 22				
	2216	+ 8 9	S		6 41 26 06	+ 2 06	28 12	S		7 0 47 96	+ 1 33	49 29	19 21 17	m s 19 21 165	+ 0 008	+ 0 241	19 21 414
	2228	+ 16 20	S		43 34 71	+ 1 88	36 59	S		2 56 34	+ 1 38	57 72	21 13				
	2306	+ 11 7	S		57 37 10	+ 2 00	39 10	S		16 58 92	+ 1 34	60 26	21 16				
	2322	+ 9 21	S		59 42 22	+ 2 04	44 26	S		19 4 13	+ 1 33	5 46	21 20				
	2331	+ 30 19	N	s Q − 1 70	7 2 27 25	− 1 84	25 41	N	s Q − 1 40	7 21 47 94	− 1 34	46 60	19 21 19	m s 19 21 150	+ 0 008	+ 0 241	19 21 399
	2340	+ 30 26	N		4 16 90	− 1 84	15 06	N		23 37 51	− 1 33	36 18	21 12				
	2350	+ 24 19	N		5 53 78	− 1 71	52 07	N		25 14 62	− 1 38	13 24	21 17				
	2383	+ 26 53	N		10 22 98	− 1 75	21 23	N		29 43 71	− 1 36	42 35	21 12				
	2362	+ 16 21	S		7 7 11 53	− 1 52	10 01	S		7 26 32 53	− 1 42	31 11	19 21 10	m s 19 21 113	+ 0 008	+ 0 241	19 21 362
	2373	+ 3 18	S		8 42 25	− 1 23	41 02	S		28 3 63	− 1 50	2 13	21 11				
	2398	+ 16 44	S		11 54 56	− 1 53	53 03	S		31 15 53	− 1 42	14 11	21 08				
	2410	+ 22 11	S		13 41 59	− 1 65	39 94	S		33 2 49	− 1 39	1 10	21 16				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$.

KALIANPUR (E) *Lat* 24° 7′, *Long* 5ʰ 10ᵐ 47ˢ: **AND BOMBAY (W)** *Lat.* 18° 54′, *Long* 4ʰ 51ᵐ 25ˢ

Astronomical Date	Star		Transits Observed at E, By *Lenox Conyngham, with Telescope No 9*					Transits Observed at W, By *Burrard, with Telescope No 1*					Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns. for Persl. Equations $C_W - B_W = + 0^s 241$, $C_E - B_E = + 0\ 241$	$\Delta L - \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1890		°			h m s	s	s			h m s	s	s	m s	m s			
Jan 19	2237	+ 34 6	N	*I P E*	6 45 36 70	+1 70	38 40	N	*I P E*	7 4 58 19	+1 39	59 58	19 21 18	19 21 180	+ 0 008	+ 0 241	19 21 429
	2278	+ 26 4	N	d c + 0 2	52 44 74	+1 71	46 45	N	d c + 0 1	12 6 25	+1 39	7 64	21 19				
	2287	+ 29 22	N	b + 0 5 a + 4 6	54 19 07	+1 71	20 78	N	b − 2 0 a 0 0	13 40 51	+1 39	41 90	21 12				
	2299	+ 24 22	N	s Q + 1 70	55 46 92	+1 71	48 63	N	s Q + 1 44	15 8 47	+1 39	9 86	21 23				
	2228	+ 16 20	S		6 43 34 18	+1 72	35 90	S		7 2 55 69	+1 39	57 08	19 21 18	19 21 153	+ 0 008	+ 0 241	19 21 402
	2306	+ 11 7	S		57 36 68	+1 73	38 41	S		16 58 15	+1 39	59 54	21 13				
	2322	+ 9 21	S		59 41 89	+1 74	43 63	S		19 3 38	+1 40	4 78	21 15				
	2331	+ 30 19	N	s Q − 1 70	7 2 26 55	−1 69	24 86	N	s Q − 1 44	7 21 47 38	−1 49	45 89	19 21 03	19 21 113	+ 0 008	+ 0 241	19 21 362
	2340	+ 30 26	N		4 16 13	−1 69	14 44	N		23 37 05	−1 49	35 56	21 12				
	2350	+ 24 19	N		5 53 12	−1 69	51 43	N		25 14 08	−1 49	12 59	21 16				
	2383	+ 26 53	N		10 22 30	−1 69	20 61	N		29 43 24	−1 49	41 75	21 14				
	2362	+ 16 21	S		7 7 11 08	−1 68	9 40	S		7 26 31 95	−1 49	30 46	19 21 06	19 21 070	+ 0 008	+ 0 241	19 21 319
	2378	+ 3 18	S		8 42 05	−1 65	40 40	S		28 2 97	−1 48	1 49	21 09				
	2398	+ 16 44	S		11 54 13	−1 68	52 45	S		31 14 98	−1 49	13 49	21 04				
	2410	+ 22 11	S		13 41 05	−1 69	39 36	S		33 1 94	−1 49	0 45	21 09				
Jan. 20	2237	+ 34 6	N	*I P E*	6 45 36 07	+1 74	37 81	N	*I P E*	7 4 57 55	+1 41	58 96	19 21 15	19 21 095	+ 0 008	+ 0 241	19 21 344
	2278	+ 26 4	N	d c + 0 2	52 44 20	+1 76	45 96	N	d c + 0 1	12 5 60	+1 39	6 99	21 03				
	2287	+ 29 22	N	b + 1 1 a + 8 0	54 18 47	+1 76	20 23	N	b − 1 5 a − 5 7	13 39 93	+1 40	41 33	21 10				
	2299	+ 24 22	N	s Q + 1 74	55 46 36	+1 77	48 13	N	s Q + 1 41	15 7 85	+1 38	9 23	21 10				
	2216	+ 8 9	S		6 41 25 14	+1 81	26 95	S		7 0 46 68	+1 36	48 04	19 21 09	19 21 058	+ 0 008	+ 0 241	19 21 307
	2228	+ 16 20	S		43 33 63	+1 79	35 42	S		2 55 08	+1 37	56 45	21 03				
	2306	+ 11 7	S		57 36 04	+1 80	37 84	S		16 57 56	+1 36	58 92	21 08				
	2322	+ 9 21	S		59 41 30	+1 81	43 11	S		19 2 78	+1 36	4 14	21 03				

KALIANPUR (E) *Lat* $24^\circ\ 7'$, *Long* $5^h\ 10^m\ 47^s$; AND BOMBAY (W) *Lat* $18^\circ\ 54'$, *Long* $4^h\ 51^m\ 25^s$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $C_K - B_K = +0^s\ 241$; $C_B - B_B = +0\ 241$	$\Delta L - \rho$
1890		°			h m s	s	s			h m s	s	s	m s				
Jan 20	2331	+ 30 19	N	*I P E*	7 2 25 96	− 1 72	24 24	N	*I P E*	7 21 46 75	− 1 42	45 33	19 21 09				
	2340	+ 30 26	N	d c + 0 2	4 15 56	− 1 72	13 84	N	d c + 0 1	23 36 39	− 1 42	34 97	21 13	m s 19 21 118	+ 0 008	+ 0 241	19 21 367
	2350	+ 24 19	N	b + 1 1 a + 8 0	5 52 54	− 1 71	50 83	N	b − 1 5 a − 5 7	25 13 40	− 1 44	11 96	21 13				
	2383	+ 26 53	N	s Q − 1 74	10 21 73	− 1 71	20 02	N	s Q − 1 41	29 42 57	− 1 43	41 14	21 12				
	2362	+ 16 21	S		7 10 48	− 1 69	8 79	S		7 26 31 39	− 1 45	29 94	19 21 15				
	2378	+ 3 18	S		8 41 44	− 1 66	39 78	S		28 2 36	− 1 47	0 89	21 11	m s 19 21 120	+ 0 008	+ 0 241	19 21 369
	2398	+ 16 44	S		11 53 47	− 1 69	51 78	S		31 14 30	− 1 46	12 84	21 06				
	2410	+ 22 11	S		13 40 39	− 1 70	38 69	S		32 61 29	− 1 44	59 85	21 16				
Jan 21	2237	+ 34 6	N	*I P W*	6 45 35 84	+ 1 38	37 22	N	*I P W*	7 4 56 97	+ 1 46	58 43	19 21 21				
	2278	+ 26 4	N	d c − 1 8	52 43 76	+ 1 57	45 33	N	d c − 1 7	12 5 08	+ 1 43	6 51	21 18	m s 19 21 175	+ 0 007	+ 0 241	19 21 423
	2287	+ 29 22	N	b − 2 0 a + 47 3	54 18 18	+ 1 49	19 67	N	b + 1 1 a − 9 5	13 39 36	+ 1 44	40 80	21 13				
	2299	+ 24 22	N	s Q + 1 70	55 45 88	+ 1 61	47 49	N	s Q + 1 41	15 7 25	+ 1 42	8 67	21 18				
	2216	+ 8 9	S		6 41 24 42	+ 1 91	26 33	S		7 0 46 09	+ 1 35	47 44	19 21 11				
	2228	+ 16 20	S		43 33 08	+ 1 76	34 84	S		2 54 54	+ 1 39	55 93	21 09	m s 19 21 093	+ 0 007	+ 0 241	19 21 341
	2306	+ 11 7	S		57 35 39	+ 1 86	37 25	S		16 56 99	+ 1 36	58 35	21 10				
	2322	+ 9 21	S		59 40 60	+ 1 89	42 49	S		19 2 21	+ 1 35	3 56	21 07				
	2340	+ 30 26	N	s Q − 1 70	7 4 15 22	− 1 93	13 29	N	s Q − 1 41	7 23 35 80	− 1 37	34 43	19 21 14				
	2350	+ 24 19	N		5 52 04	− 1 79	50 25	N		25 12 87	− 1 40	11 47	21 22	m s 19 21 173	+ 0 007	+ 0 241	19 21 421
	2388	+ 26 53	N		10 21 31	− 1 86	19 45	N		29 42 00	− 1 39	40 61	21 16				
	2362	+ 16 21	S		7 7 9 87	− 1 64	8 23	S		7 26 30 80	− 1 43	29 37	19 21 14				
	2373	+ 3 18	S		8 40 60	− 1 40	39 20	S		28 1 89	− 1 49	0 40	21 20	m s 19 21 148	+ 0 007	+ 0 241	19 21 396
	2398	+ 16 44	S		11 52 89	− 1 65	51 24	S		31 13 80	− 1 43	12 37	21 13				
	2410	+ 22 11	S		13 39 93	− 1 75	38 18	S		32 60 71	− 1 41	59 30	21 12				

OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL + ρ.

KALIANPUR (E) *Lat 24° 7′, Long 5h 10m 47s*; AND BOMBAY (W) *Lat 18° 54′, Long 4h 51m 25s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, *By Lenox Conyngham, with Telescope No. 2*: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, *By Burrard, with Telescope No 1*: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Pers. Equations $C_N - B_N = + 0^s.241$, $C_S - B_S = + 0.241$	ΔL + ρ
1890		°			h m s	s	s			h m s	s	s	m s				
Jan 15	2668	+ 25 24	N	*I P W*	7 35 46 65	+ 1 57	48 22	N	*I P E*	7 55 9 49	+ 0 04	9 53	19 21 31	m s 19 21 315	− 0 021	+ 0 241	19 21 535
	2672	+ 28 6	N	d c − 1 8	37 26 64	+ 1 59	28 23	N	d c + 0 1	56 49 50	+ 0 05	49 55	21 32				
	2703	+ 22 46	N	b − 0 6 a − 35 2	40 45 75	+ 1 53	47 28	N	b + 1 3 a − 4 8	8 0 8 57	+ 0 04	8 61	21 33				
	2714	+ 21 54	N	s Q + 1 60	41 58 44	+ 1 52	59 96	N	s Q 0 00	1 21 22	+ 0 04	21 26	21 30				
	2639	+ 16 5	S		7 31 25 82	+ 1 43	27 25	S		7 50 48 48	+ 0 02	48 50	19 21 25	m s 19 21 248	− 0 021	+ 0 241	19 21 468
	2649	+ 16 49	S		32 56 06	+ 1 44	57 50	S		52 18 73	+ 0 03	18 76	21 26				
	2654	+ 13 33	S		34 74	+ 1 40	9 14	S		53 30 35	+ 0 02	30 37	21 23				
	2690	+ 13 26	S		39 37 96	+ 1 40	39 36	S		59 0 59	+ 0 02	0 61	21 25				
	2727	+ 26 10	N	s Q − 1 60	7 44 18 43	− 1 62	16 81	N	s Q 0·00	8 3 37 90	+ 0 04	37 94	19 21 13	m s 19 21 208	− 0 021	+ 0 241	19 21 438
	2747	+ 29 59	N		47 3 98	− 1 58	2 40	N		6 23 50	+ 0 05	23 55	21 15				
	2786	+ 2 35	N		54 7 18	− 1 62	5 56	N		13 26 77	+ 0 05	26 82	21 26				
	2789	+ 24 22	N		54 43 95	− 1 65	42 30	N		14 3 55	+ 0 04	3 59	21 29				
	2737	+ 14 57	S		7 45 32 45	− 1 78	30 67	S		8 4 51 77	+ 0 02	51 79	19 21 12	m s 19 21 158	− 0 021	+ 0 241	19 21 378
	2759	+ 18 0	S		48 37 62	− 1 74	35 88	S		7 57 10	+ 0 03	57 13	21 25				
	2778	+ 9 32	S		51 17 46	− 1 85	15 61	S		10 36 73	+ 0 01	36 74	21 13				
	2782	+ 9 12	S		52 18 73	− 1 85	16 88	S		11 38 00	+ 0 01	38 01	21 13				
Jan 17	2668	+ 25 24	N	*I P W*	7 35 49 69	+ 1 63	51 32	N	*I P W*	7 55 11 22	+ 1 41	12 63	19 21 31	m s 19 21 395	− 0 023	+ 0 241	19 21 613
	2672	+ 28 6	N	d c − 1 8	37 29 68	+ 1 66	31 34	N	d c − 1 7	56 51 31	+ 1 43	52 74	21 40				
	2703	+ 22 46	N	b − 1 5 a − 28 9	40 48 83	+ 1 60	50 43	N	b + 1 3 a − 8 7	8 0 10 41	+ 1 40	11 81	21 38				
	2714	+ 21 54	N	s Q + 1 70	42 1 41	+ 1 59	3 00	N	s Q + 1 40	1 23 09	+ 1 40	24 49	21 49				
	2639	+ 16 5	S		7 31 28 78	+ 1 53	30 31	S		7 50 50 27	+ 1 38	51 65	19 21 34	m s 19 21 335	− 0 023	+ 0 241	19 21 553
	2649	+ 16 49	S		32 59 05	+ 1 54	60 59	S		52 20 49	+ 1 38	21 87	21 28				
	2654	+ 13 33	S		34 10 69	+ 1 51	12 20	S		53 32 17	+ 1 37	33 54	21 34				
	2690	+ 13 26	S		39 40 96	+ 1 51	42 47	S		59 2 48	+ 1 37	3 85	21 38				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

KALIANPUR (E) *Lat* 24° 7′, *Long* 5h 10m 47s ; AND BOMBAY (W) *Lat* 18° 54′, *Long* 4h 51m 25s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Peral Equations $C_N - B_N = +0.241$, $C_S - B_S = +0.241$	$\Delta L + \rho$
1800		° ′			h m s	s	s			h m s	s	s	m s				
Jan 17	2727	+ 26 10	N	I P W	7 44 21 69	−1 75	19 94	N	I P W	8 3 42 65	−1 38	41 27	19 21 33	m s 19 21 323	− 0 023	+ 0 241	19 21 541
	2747	+ 29 59	N	d c − 1 8	47 7 19	−1 71	5 48	N	d c − 1 7	6 28 23	−1 37	26 86	21 38				
	2786	+ 27 35	N	b − 1 5 a − 28 9	54 10 36	−1 75	8 61	N	b + 1 3 a − 8 7	13 31 38	−1 38	30 00	21 39				
	2789	+ 24 22	N	s Q − 1 70	54 47 18	−1 78	45 40	N	s Q − 1 40	14 7 98	−1 39	6 59	21 19				
	2737	+ 14 57	S		7 45 35 68	−1 88	33 80	S		8 4 56 52	−1 42	55 10	19 21 30	m s 19 21 328	− 0 023	+ 0 241	19 21 546
	2759	+ 18 0	S		48 40 88	−1 85	39 03	S		8 1 80	−1 41	0 39	21 36				
	2778	+ 9 32	S		51 20 62	−1 93	18 69	S		10 41 44	−1 44	40 00	21 31				
	2782	+ 9 12	S		52 21 90	−1 94	19 96	S		11 42 74	−1 44	41 30	21 34				
Jan 18	2663	+ 25 24	N	I P E	7 35 51 43	+1 67	53 10	N	I P W	7 55 12 98	+1 43	14 41	19 21 31	m s 19 21 355	− 0 025	+ 0 241	19 21 571
	2672	+ 28 6	N	d c + 0 2	37 31 51	+1 62	33 13	N	d c − 1 7	56 53 07	+1 45	54 52	21 39				
	2703	+ 22 46	N	b + 0 2 a + 58 2	40 50 49	+1 3	52 22	N	b + 1 2 a − 14 6	8 0 12 15	+1 41	13 56	21 34				
	2714	+ 21 54	N	s Q + 1 70	42 3 09	+1 75	4 84	N	s Q + 1 40	1 24 81	+1 41	26 22	21 38				
	2639	+ 16 5	S		7 31 30 25	+1 89	32 14	S		7 50 52 08	+1 37	53 45	19 21 31	m s 19 21 333	− 0 025	+ 0 241	19 21 549
	2619	+ 16 49	S		33 0 46	+1 87	2 33	S		52 22 33	+1 38	23 71	21 38				
	2654	+ 13 33	S		34 12 04	+1 94	13 98	S		53 33 95	+1 36	35 31	21 33				
	2690	+ 13 26	S		39 42 30	+1 95	44 25	S		59 4 20	+1 36	5 56	21 31				
	2727	+ 26 10	N	s Q − 1 70	7 44 23 46	−1 75	21 71	N	s Q − 1 40	8 3 44 41	−1 36	43 05	19 21 34	m s 19 21 305	− 0 025	+ 0 241	19 21 521
	2747	+ 29 59	N		47 9 18	−1 83	7 35	N		6 30 00	−1 34	28 66	21 31				
	2786	+ 27 35	N		54 12 24	−1 77	10 47	N		13 33 13	−1 35	31 78	21 31				
	2789	+ 24 22	N		54 48 92	−1 71	47 21	N		14 9 85	−1 38	8 47	21 26				
	2737	+ 14 57	S		7 45 37 09	−1 48	35 61	S		8 4 58 33	−1 43	56 90	19 21 29	m s 19 21 338	− 0 025	+ 0 241	19 21 554
	2759	+ 18 0	S		48 42 42	−1 55	40 87	S		8 3 58	−1 42	2 16	21 29				
	2778	+ 9 32	S		51 21 84	−1 37	20 47	S		10 43 30	−1 46	41 84	21 37				
	2782	+ 9 12	S		52 23 12	−1 36	21 76	S		11 44 63	−1 47	43 16	21 40				

OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL + ρ.

KALIANPUR (E) *Lat* 24° 7′ *Long* 5ʰ 10ᵐ 47ˢ; AND BOMBAY (W) *Lat* 18° 54′, *Long* 4ʰ 51ᵐ 25ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham with Telescope No 2): Star's Aspect	In strumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard, with Telescope No 1): Star's Aspect	In strumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl. Equations $C_W - B_E = + 0.241$, $C_E - B_W = + 0.241$	ΔL + ρ
1890		°			h m s	s	s			h m s	s	s	m s	m s			
Jan 19	2668	+ 25 24	N	I P E	7 35 53 23	+1 71	54 94	N	I P E	7 55 14 93	+1 39	16 32	19 21 38	= 19 21 415	− 0 026	+ 0 241	19 21 630
	2672	+ 28 6	N	d c + 0 2	37 33 31	+1 71	35 02	N	d c + 0 1	56 55 00	+1 39	56 39	21 37				
	2703	+ 22 46	N	b + 0 5 a + 4 6	40 52 31	+1 71	54 02	N	b − 2 0 a 0 0	8 0 14 10	+1 39	15 49	21 47				
	2714	+ 21 54	N	s Q + 1 70	42 4 95	+1 71	6 66	N	s Q + 1 44	1 26 71	+1 39	28 10	21 44				
	2639	+ 16 5	S		7 31 32 28	+1 73	34 01	S		7 50 54 00	+1 39	55 39	19 21 38	= 19 21 370	− 0 026	+ 0 241	19 21 585
	2649	+ 16 49	S		33 2 53	+1 72	4 25	S		52 24 22	+1 39	25 61	21 36				
	2654	+ 13 33	S		34 14 17	+1 73	15 90	S		53 35 88	+1 39	37 27	21 37				
	2690	+ 13 26	S		39 44 35	+1 73	46 08	S		59 6 06	+1 39	7 45	21 37				
	2727	+ 26 10	N	s Q − 1 70	7 44 25 25	−1 69	23 56	N	s Q − 1 44	8 3 46 36	−1 49	44 87	19 21 31	= 19 21 320	− 0 026	+ 0 241	19 21 535
	2747	+ 29 59	N		47 10 82	−1 69	9 13	N		6 31 95	−1 49	30 46	21 33				
	2786	+ 2, 35	N		54 13 94	−1 69	12 25	N		13 35 11	−1 49	33 62	21 37				
	2789	+ 24 22	N		54 50 75	−1 69	49 06	N		14 11 82	−1 49	10 33	21 27				
	2737	+ 14 57	S		7 45 39 06	−1 67	37 39	S		8 4 60 21	−1 49	58 72	19 21 33	= 19 21 2,0	− 0 026	+ 0 241	19 21 485
	2759	+ 18 0	S		48 44 38	−1 68	42 ,0	S		8 5 40	−1 49	3 91	21 21				
	27"8	+ 9 32	S		51 24 03	−1 66	22 37	S		10 45 12	−1 48	43 64	21 27				
	2782	+ 9 12	S		52 25 28	−1 66	23 62	S		11 46 37	−1 48	44 89	21 27				
Jan 20	2669	+ 25 24	N	I P E	7 35 55 15	+1 77	56 92	N	I P E	7 55 16 88	+1 39	18 27	19 21 35	= 19 21 353	− 0 027	+ 0 241	19 21 567
	2672	+ 28 6	N	d c + 0 2	37 35 21	+1 77	36 98	N	d c + 0 1	56 56 96	+1 39	58 35	21 37				
	2703	+ 22 46	N	b + 1 1 a + 8 0	40 54 22	+1 77	55 99	N	b − 1 5 a − 5 7	8 0 15 90	+1 38	17 28	21 29				
	2714	+ 21 54	N	s Q + 1 74	42 6 85	+1 78	8 63	N	s Q + 1 41	1 28 65	+1 38	30 03	21 40				
	2639	+ 16 5	S		7 31 34 17	+1 80	35 97	S		7 50 55 84	+1 37	57 21	19 21 24	= 19 21 323	− 0 027	+ 0 241	19 21 537
	2649	+ 16 49	S		33 4 40	+1 79	6 19	S		52 26 15	+1 37	27 52	21 33				
	2654	+ 13 33	S		34 16 03	+1 79	17 82	S		53 37 79	+1 37	39 16	21 34				
	2690	+ 13 26	S		39 46 24	+1 79	48 03	S		59 8 04	+1 37	9 41	21 38				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$.

KALIANPUR (E) *Lat 24° 7′, Long 5h 10m 47s*: AND BOMBAY (W) *Lat 18° 54′ Long 4h 51m 20s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl. Equations $C_E - B_E = +0^s.241$, $C_B - B_S = +0.241$	$\Delta L + \rho$
1890					h m s	s	s			h m s	s	s	m s				
Jan 20	2727	+ 26 10	N	*I P E*	7 44 27 16	− 1 72	25 44	N	*I P E*	8 3 48 28	− 1 43	46 85	19 21 41				
	2747	+ 29 59	N	d c + 0 2	47 12 79	− 1 ,2	11 07	N	d c + 0 1	6 33 77	− 1 42	32 35	21 28	m s 19 21 365	− 0 027	+ 0 241	19 1 579
	2786	+ 27 35	N	b + 1 1 a + 8 0	54 15 87	− 1 71	14 16	N	b − 1 5 a − 5 7	13 37 00	− 1 43	35 57	21 41				
	2789	+ 24 22	N	s Q − 1 74	54 52 65	− 1 71	50 94	N	s Q − 1 41	14 13 74	− 1 44	12 30	21 36				
	2737	+ 14 57	S		7 45 41 00	− 1 68	39 32	S		8 5 2 15	− 1 45	0 70	19 21 38				
	2778	+ 9 32	S		51 25 89	− 1 67	24 22	S		10 46 98	− 1 46	45 52	21 30	m s 19 21 330	− 0 027	+ 0 241	19 21 544
	2782	+ 9 12	S		52 27 19	− 1 67	25 52	S		11 48 29	− 1 46	46 83	21 31				
Jan 21	2668	+ 25 24	N	*I P W*	7 35 57 45	+ 1 59	59 04	N	*I P W*	7 55 18 97	+ 1 43	20 40	19 21 36				
	2672	+ 28 6	N	d c − 1 8	37 37 56	+ 1 51	39 07	N	d c − 1 7	56 59 04	+ 1 44	60 48	21 41	m s 19 21 380	− 0 029	+ 0 241	19 21 592
	2703	+ 22 46	N	b − 2 0 a + 47 3	40 56 48	+ 1 64	58 12	N	b + 1 1 a − 9 8	8 0 18 05	+ 1 42	19 47	21 35				
	2714	+ 21 54	N	s Q + 1 70	42 9 14	+ 1 65	10 79	N	s Q + 1 41	1 30 ,8	+ 1 41	32 19	21 40				
	2639	+ 16 5	S		7 31 36 24	+ 1 77	38 01	S		, 50 58 03	+ 1 39	59 42	19 21 41				
	2649	+ 16 49	S		33 6 49	+ 1 75	8 24	S		52 28 31	+ 1 39	29 70	21 46	m s 19 21 388	− 0 029	+ 0 241	19 21 600
	2654	+ 13 33	S		34 18 08	+ 1 81	19 89	S		53 39 80	+ 1 38	41 18	21 29				
	2690	+ 13 26	S		39 48 36	+ 1 81	50 17	S		59 10 18	+ 1 38	11 56	21 39				
	2727	+ 26 10	N	s Q − 1 ,0	7 44 29 51	− 1 83	27 68	N	s Q − 1 41	8 3 50 31	− 1 39	48 92	19 21 24				
	2747	+ 29 59	N		47 15 17	− 1 92	13 25	N		6 36 00	− 1 37	34 63	21 38	m s 19 21 288	− 0 029	+ 0 241	19 21 500
	2786	+ 27 35	N		54 18 23	− 1 87	16 36	N		13 39 07	− 1 38	3, 69	21 33				
	2789	+ 24 22	N		54 54 98	− 1 79	53 19	N		14 15 79	− 1 40	14 39	21 20				
	2737	+ 14 57	S		7 45 43 14	− 1 61	41 53	S		8 5 4 20	− 1 44	2 76	19 21 23				
	2759	+ 18 0	S		48 48 41	− 1 67	46 74	S		8 9 44	− 1 42	8 02	21 28	m s 19 21 258	− 0 029	+ 0 241	19 21 470
	2778	+ 9 32	S		51 28 03	− 1 51	26 52	S		10 49 18	− 1 47	47 71	21 19				
	2782	+ 9 12	S		52 29 19	− 1 51	27 68	S		11 50 48	− 1 47	49 01	21 33				

OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL − ρ

JUBBULPORE (E) *Lat* 23° 10′ *Long* 5h 19m 55s AND KALIANPUR (W) *Lat* 24° 7′, *Long* 5h 10m 47s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Persl Equations $B_N - C_N = -0^s\ 241$, $B_S - C_S = -0\ 241$	ΔL − ρ
1890					h m s	s	s			h m s	s	s	m s				
Feb 4	2841	+ 26 34	N	L P E	8 22 44 65	+ 1 80	46 45	N	I P W	8 31 55 34	+ 1 64	56 98	9 10 53	m s 9 10 488	+ 0 007	− 0 241	9 10 254
	2850	+ 24 27	N	d c − 4 4	24 31 71	+ 1 81	33 52	N	d c + 1 5	33 42 36	+ 1 64	44 00	10 48				
	2871	+ 36 48	N	b + 5 1 a + 10 5	27 11 51	+ 1 75	13 26	N	b − 3 1 a − 3 3	36 21 99	+ 1 66	23 65	10 39				
	2912	+ 32 20	N	s Q + 1 80	33 0 63	+ 1 77	2 40	N	s Q + 1 68	42 11 30	+ 1 65	12 95	10 55				
	2862	+ 20 49	S		8 25 52 22	+ 1 82	54 04	S		8 35 2 97	+ 1 65	4 62	9 10 58	m s 9 10 610	+ 0 007	− 0 241	9 10 376
	2888	+ 15 42	S		29 28 89	+ 1 85	30 74	S		38 39 75	+ 1 63	41 38	10 64				
	2965	+ 29 10	N	s Q − 1 80	8 39 37 57	− 1 81	35 76	N	s Q − 1 68	8 48 47 97	− 1 71	46 26	9 10 50	m s 9 10 500	+ 0 007	− 0 241	9 10 266
	3000	+ 28 40	N		45 26 88	− 1 81	25 07	N		54 37 25	− 1 71	35 54	10 47				
	3002	+ 28 45	N		45 37 78	− 1 81	35 97	N		54 48 21	− 1 71	46 50	10 53				
	2937	+ 21 52	S		8 36 30 25	− 1 78	28 47	S		8 45 40 67	− 1 71	38 96	9 10 49	m s 9 10 488	+ 0 007	− 0 241	9 10 254
	2970	+ 12 31	S		40 29 23	− 1 75	27 48	S		49 39 72	− 1 74	37 98	10 50				
	2978	+ 6 15	S		42 11 40	− 1 72	9 68	S		51 21 89	− 1 74	20 15	10 47				
	2987	− 3 2	S		43 25 07	− 1 70	23 37	S		52 35 60	− 1 74	33 86	10 49				
Feb 5	2841	+ 26 34	N	I P W	8 22 43 51	+ 1 91	s 45 42	N	I P W	8 31 54 25	+ 1 71	55 96	9 10 54	m s 9 10 445	+ 0 007	− 0 241	9 10 211
	2850	+ 24 27	N	d c + 2 8	24 30 64	+ 1 92	32 56	N	d c + 1 5	33 41 34	+ 1 66	43 00	10 44				
	2871	+ 36 48	N	b + 3 1 a + 10 1	27 10 30	+ 1 87	12 17	N	b − 1 5 a − 53 4	36 20 63	+ 1 98	22 61	10 44				
	2912	+ 32 20	N	s Q + 1 78	32 59 59	+ 1 89	61 48	N	s Q + 1 65	42 9 99	+ 1 85	11 84	10 36				
	2862	+ 20 49	S		8 25 51 17	+ 1 93	53 10	S		8 35 2 00	+ 1 58	3 58	9 10 48	m s 9 10 420	+ 0 007	− 0 241	9 10 186
	2880	+ 19 38	S		28 30 41	+ 1 93	32 34	S		37 41 22	+ 1 56	42 78	10 44				
	2888	+ 15 42	S		29 28 00	+ 1 95	29 95	S		38 38 85	+ 1 47	40 32	10 37				
	2899	+ 19 39	S		30 58 85	+ 1 94	60 79	S		40 9 63	+ 1 55	11 18	10 39				

OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL − ρ

JUBBULPORE (E) *Lat* 23° 10′, *Long* 5ʰ 19ᵐ 58ˢ; AND KALIANPUR (W) *Lat* 24° 7′ *Long* 5ʰ 10ᵐ 47ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Difference (W − E): Mean of Group	Correction for Rate of E Clock	Corrns for Personal Equations $B_N - C_N = -0^s.241$, $B_S - C_S = -0.241$	ΔL − ρ
1890		° ′			h m s	s	s			h m s	s	s	m s				
Feb 5	2952	+ 31 6	N	I P W	8 38 10 50	− 1 67	8 83	N	I P W	8 47 20 83	− 1 48	19 35	9 10 52	m s 9 10 575	+ 0 007	− 0 241	9 10 341
	2965	+ 29 10	N	d c + 2 8	39 36 30	− 1 66	34 64	N	d c + 1 5	48 46 76	− 1 53	45 23	10 59				
	3000	+ 28 40	N	b + 3 1 a + 10 1	45 25 56	− 1 65	23 91	N	b − 1 5 a − 53 4	54 36 02	− 1 54	34 48	10 57				
	3002	+ 28 45	N	s Q − 1 78	45 36 52	− 1 66	34 86	N	s Q − 1 65	54 47 02	− 1 54	45 48	10 62				
	2970	+ 12 31	S		8 40 28 00	− 1 61	26 39	S		8 49 ,8 81	− 1 90	36 91	9 10 52	m s 9 10 540	+ 0 007	− 0 241	9 10 306
	29,8	+ 6 15	S		42 10 21	− 1 58	8 63	S		51 21 16	− 2 02	19 14	10 ,1				
	2987	− 3 2	S		43 23 ,8	− 1 56	22 22	S		52 35 00	− 2 19	32 81	10 59				
Feb 6	2841	+ 26 34	N	I P W	8 22 42 37	+ 1 90	44 27	N	I P E	8 31 53 21	+ 1 53	54 ,4	9 10 47	m s 9 10 445	+ 0 008	− 0 241	9 10 212
	2850	+ 24 27	N	d c + 2 8	24 29 40	+ 1 91	31 31	N	d c − 3 1	33 40 27	+ 1 53	41 80	10 49				
	2871	+ 36 48	N	b + 1 9 a + 6 7	2, 9 18	+ 1 88	11 06	N	b − 3 1 a − 0 5	36 19 88	+ 1 52	21 40	10 34				
	2912	+ 32 20	N	s Q + 1 ,9	32 58 33	+ 1 88	60 21	N	s Q + 1 69	42 9 16	+ 1 53	10 69	10 48				
	2862	+ 20 49	S		8 25 50 02	+ 1 92	51 94	S		8 35 0 82	+ 1 55	2 37	9 10 43	m s 9 10 410	+ 0 008	− 0 241	9 10 1,7
	2888	+ 15 42	S		29 26 80	+ 1 92	28 ,2	S		38 37 57	+ 1 55	39 12	10 40				
	2899	+ 19 39	S		30 57 66	+ 1 92	59 58	S		40 8 43	+ 1 55	9 98	10 40				
	2952	+ 31 6	N	s Q − 1 79	8 38 9 24	− 1 69	, 55	N	s Q − 1 69	8 47 19 96	− 1 85	18 11	9 10 56	m s 9 10 575	+ 0 008	− 0 241	9 10 342
	2965	+ 29 10	N		39 35 21	− 1 69	33 52	N		48 45 84	− 1 85	43 99	10 47				
	3000	+ 28 40	N		45 24 40	− 1 69	22 ,1	N		54 35 18	− 1 85	33 33	10 62				
	3002	+ 28 45	N		45 35 33	− 1 69	33 64	N		54 46 14	− 1 85	44 29	10 65				
	2937	+ 21 52	S		8 36 2, 95	− 1 67	26 28	S		8 45 38 54	− 1 83	36 71	9 10 43	m s 9 10 553	+ 0 008	− 0 241	9 10 320
	2970	+ 12 31	S		40 26 93	− 1 66	25 27	S		49 37 59	− 1 83	35 76	10 49				
	2978	+ 6 15	S		42 8 93	− 1 65	, 28	S		51 19 73	− 1 83	17 90	10 62				
	2987	− 3 2	S		43 22 61	− 1 62	20 99	S		52 33 49	− 1 83	31 66	10 67				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

JUBBULPORE (E) *Lat* 23° 10 *Long* 5ʰ 19ᵐ 58ˢ; AND KALIANPUR (W) *Lat* 24° 7′, *Long* 5ʰ 10ᵐ 47ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl. Equations $B_N - C_N = -0^s\,241$, $B_S - C_S = -0\,241$	$\Delta L - \rho$
1890					h m s	s	s			h m s	s	s	m s	m s			
Feb 7	2841	+ 26 34	N	I P E	8 22 41 33	+ 1 64	42 97	N	I P E	8 31 51 78	+ 1 61	53 39	9 10 42	9 10 423	+ 0 008	− 0 241	9 10 190
	2850	+ 24 7	N	d c − 4 4	24 28 34	+ 1 67	30 01	N	d c − 1	33 38 81	+ 1 61	40 42	10 41				
	2871	+ 36 48	N	b + 1 6 a + 23 4	27 8 14	+ 1 52	9 66	N	b + 0 3 a + 1 7	36 18 46	+ 1 59	20 05	10 39				
	2912	+ 3 20	N	s Q + 1 ,5	32 5, 29	+ 1 57	58 86	N	s Q + 1 68	42 7 ,3	+ 1 60	9 33	10 4,				
	2862	+ 20 49	S		8 2, 48 83	+ 1 70	50 53	S		8 34 59 35	+ 1 62	60 97	9 10 44	9 10 438	+ 0 008	− 0 241	9 10 205
	2880	+ 19 58	S		28 28 09	+ 1 ,2	29 81	S		3, 38 57	+ 1 62	40 19	10 38				
	2888	+ 15 42	S		29 5 62	+ 1 ,6	27 38	S		38 36 14	+ 1 63	3, 77	10 39				
	2899	+ 19 39	S		30 56 35	+ 1 ,3	58 08	S		40 7 00	+ 1 62	8 62	10 54				
	2952	+ 31 6	N	s Q − 1 7	8 38 8 2,	− 1 90	6 37	N	s Q − 1 68	8 47 18 50	− 1 ,6	16 74	9 10 37	9 10 448	+ 0 008	− 0 241	9 10 215
	2965	+ 29 10	N		39 34 01	− 1 88	32 13	N		48 44 39	− 1 75	42 64	10 51				
	3000	+ 28 40	N		45 23 4,	− 1 89	21 57	N		54 33 71	− 1 75	31 96	10 39				
	3002	+ 28 45	N		45 34 27	− 1 88	32 39	N		54 44 66	− 1 75	42 91	10 52				
	2970	+ 12 31	S		8 40 2, ,	− 1 71	23 84	S		8 49 36 12	− 1 73	34 39	9 10 55	9 10 547	+ 0 008	− 0 241	9 10 314
	2978	+ 6 15	S		42 , 68	− 1 67	6 01	S		51 18 28	− 1 73	16 55	10 54				
	2987	− 3 2	S		43 21 30	− 1 59	19 71	S		52 31 98	− 1 72	30 26	10 55				
Feb 8	2841	+ 26 34	N	I P E	8 22 40 12	+ 1 71	41 83	N	I P E	8 31 50 ,1	+ 1 63	52 34	9 10 51	9 10 508	+ 0 007	− 0 241	9 10 274
	2850	+ 24 27	N	d c − 4 4	24 2, 18	+ 1 74	28 92	N	d c − 3 1	33 37 80	+ 1 64	39 44	10 52				
	2871	+ 36 48	N	b + 5 3 a + 35 1	27 7 00	+ 1 53	8 53	N	b + 0 8 a + 7 8	36 1, 44	+ 1 58	19 02	10 49				
	2912	+ 32 20	N	s Q + 1 74	32 56 17	+ 1 61	57 ,8	N	s Q + 1 70	42 6 68	+ 1 61	8 29	10 51				
	2862	+ 20 49	S		8 2, 47 ,1	+ 1 80	49 51	S		8 34 58 35	+ 1 66	60 01	9 10 50	9 10 508	+ 0 007	− 0 241	9 10 2[illegible]4
	2880	+ 19 58	S		28 26 93	+ 1 82	28 75	S		37 37 54	+ 1 66	39 20	10 45				
	2888	+ 15 42	S		29 24 35	+ 1 87	26 22	S		38 35 11	+ 1 68	36 79	10 57				
	2899	+ 19 39	S		30 55 33	+ 1 82	57 15	S		40 6 00	+ 1 66	, 66	10 51				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$.

JUBBULPORE (E) *Lat 23° 10′ Long 5h 19m 58s*; AND KALIANPUR (W) *Lat 24° 7′, Long 5h 10m 47s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard, with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $B_N - C_N = -0^s 241$, $B_S - C_S = -0 241$	$\Delta L - \rho$
1890					h m s	s	s			h m s	s	s	m s				
Feb 8	2952	+ 31 6	N	*I P E*	8 38 7 07	−1 84	5 23	N	*I P E*	8 47 17 47	−1 ,8	15 69	9 10 46				
	2965	+ 29 10	N	d c − 4 4	39 32 92	−1 80	31 12	N	d c − 3 1	48 43 28	−1 78	41 50	10 38	m s 9 10 470	+ 0 007	− 0 241	9 10 236
	3000	+ 28 40	N	b + 5 3 a + 35 1	45 22 22	−1 80	20 42	N	b + 0 8 a + 7 8	54 32 68	−1 78	30 90	10 48				
	3002	+ 28 45	N	s Q − 1 74	45 33 12	−1 81	31 31	N	s Q − 1 ,0	54 43 65	−1 78	41 87	10 56				
	2937	+ 21 52	S		8 36 25 55	−1 ,0	23 85	S		8 45 36 06	−1 74	34 32	9 10 47				
	2970	+ 12 31	S		40 24 45	−1 57	22 88	S		49 35 05	−1 71	33 34	10 46	m s 9 10 480	+ 0 007	− 0 241	9 10 246
	2978	+ 6 15	S		42 6 53	−1 50	5 03	S		51 17 22	−1 70	15 52	10 49				
	2987	− 3 2	S		43 20 15	−1 38	18 77	S		52 30 94	−1 67	29 27	10 50				
Feb 9	2841	+ 26 34	N	*I P W*	8 22 38 99	+1 73	40 72	N	*I P W*	8 31 49 57	+1 70	51 27	9 10 55				
	2860	+ 24 27	N	d c + 2 8	24 25 96	+1 78	27 74	N	d c + 1 5	33 36 63	+1 71	38 34	10 60	m s 9 10 580	+ 0 007	− 0 241	9 10 346
	2871	+ 36 48	N	b − 1 0 a + 43 6	27 5 88	+1 52	7 40	N	b − 0 6 a − 1 1	36 16 2,	+1 71	1, 98	10 58				
	2912	+ 32 20	N	s Q + 1 75	32 55 02	+1 61	56 63	N	s Q + 1 68	42 5 52	+1 ,0	7 22	10 59				
	2862	+ 20 49	S		8 25 46 50	+1 84	48 34	S		8 34 57 19	+1 ,1	58 90	9 10 56				
	2880	+ 19 58	S		28 25 64	+1 86	27 50	S		37 36 36	+1 71	38 07	10 57	m s 9 10 573	+ 0 00,	− 0 241	9 10 339
	2888	+ 15 42	S		29 23 15	+1 93	25 08	S		38 33 93	+1 70	35 63	10 55				
	2899	+ 19 39	S		30 54 03	+1 86	55 89	S		40 4 79	+1 ,1	6 50	10 61				
	2952	+ 31 6	N	s Q − 1 75	8 38 5 86	−1 86	4 00	N	s Q − 1 68	8 47 16 31	−1 66	14 65	9 10 65				
	2965	+ 29 10	N		39 31 82	−1 83	29 99	N		48 42 16	−1 66	40 50	10 51	m s 9 10 565	+ 0 007	− 0 241	9 10 331
	3000	+ 28 40	N		45 21 17	−1 81	19 36	N		54 31 53	−1 66	29 87	10 51				
	3002	+ 28 45	N		45 32 07	−1 82	30 25	N		54 42 50	−1 66	40 84	10 59				
	2937	+ 21 52	S		8 36 24 35	−1 67	22 68	S		8 45 34 95	−1 65	33 30	9 10 62				
	2970	+ 12 31	S		40 23 19	−1 53	21 66	S		49 33 96	−1 67	32 29	10 63	m s 9 10 623	+ 0 007	− 0 241	9 10 389
	2978	+ 6 15	S		42 5 26	−1 43	3 83	S		51 16 14	−1 67	14 4,	10 64				
	2987	− 3 2	S		43 18 86	−1 29	17 57	S		52 29 84	−1 67	28 1,	10 60				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

JUBBULPORE (E) *Lat* 23° 10′, *Long* 5h 19m 58s AND KALIANPUR (W) *Lat* 24° 7′, *Long* 5h 10m 47s

Astronomical Date	Star: B.A.C. Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrn for Persl Equations $B_E - C_W = -0^s\ 241$, $B_E - C_E = -0\ 241$	$\Delta L + \rho$
1890		° ′			h m s	s	s			h m s	s	s	m s				
Feb 4	3112	+ 34 20	N	*I P E*	8 52 21 14	+1 76	22 90	N	*I P W*	9 1 31 65	+1 66	33 31	9 10 41	m s 9 10 470	+ 0 012	− 0 241	9 10 241
	3117	+ 22 29	N	d c − 4 4	53 17 03	+1 81	18 84	N	d c + 1 5	2 27 61	+1 64	29 25	10 41				
	3123	+ 22 27	N	b + 5 1, *a* + 10 5	54 16 58	+1 81	18 39	N	b − 3 1, *a* − 3 3	3 27 33	+1 64	28 97	10 58				
	3144	+ 35 5	N	s Q + 1 80	58 44 10	+1 76	45 86	N	s Q + 1 68	7 54 68	+1 66	56 34	10 48				
	3104	+ 15 43	S		8 50 30 20	+1 85	32 05	S		8 59 40 91	+1 63	42 54	9 10 49	m s 9 10 577	+ 0 012	− 0 241	9 10 348
	3129	+ 18 30	S		56 1 03	+1 84	2 87	S		9 5 11 83	+1 64	13 47	10 60				
	3138	+ 21 44	S		57 35 10	+1 82	36 92	S		6 45 91	+1 65	47 56	10 64				
	3162	+ 37 16	N	s Q − 1 80	9 2 18 45	−1 85	16 60	N	s Q − 1 68	9 11 28 99	−1 71	27 28	9 10 68	m s 9 10 603	+ 0 012	− 0 241	9 10 374
	3204	+ 26 39	N		8 33 29	−1 80	31 49	N		17 43 83	−1 72	42 11	10 62				
	3261	+ 36 53	N		17 47 66	−1 85	45 81	N		26 58 03	−1 70	56 33	10 52				
	3268	+ 36 19	N		19 22 21	−1 85	20 36	N		28 32 65	−1 70	30 95	10 59				
	3176	+ 10 15	S		9 3 53 94	−1 74	52 20	S		9 13 4 66	−1 74	2 92	9 10 72	m s 9 10 648	+ 0 012	− 0 241	9 10 419
	3183	+ 25 38	S		5 5 13	−1 79	3 34	S		14 15 69	−1 72	13 97	10 63				
	3194	+ 25 39	S		7 28 20	−1 79	26 41	S		16 38 84	−1 72	37 12	10 71				
	3250	+ 11 47	S		16 19 35	−1 74	17 61	S		25 29 88	−1 74	28 14	10 53				
Feb 5	3112	+ 34 20	N	*I P W*	8 52 19 12	+1 89	21 01	N	*I P W*	9 1 29 63	+1 91	31 54	9 10 53	m s 9 10 603	+ 0 011	− 0 241	9 10 373
	3117	+ 22 29	N	d c + 2 8	53 14 91	+1 93	16 84	N	d c + 1 5	2 25 85	+1 61	27 46	10 62				
	3123	+ 22 27	N	b + 3 1, *a* + 10 1, s Q + 1 78	54 14 50	+1 93	16 43	N	b − 1 5, *a* − 53 4, s Q + 1 65	3 25 48	+1 61	27 09	10 66				
	3104	+ 15 43	S		8 50 28 22	+1 95	30 17	S		8 59 39 21	+1 47	40 68	9 10 51	m s 9 10 647	+ 0 011	− 0 241	9 10 417
	3129	+ 18 30	S		55 59 03	+1 94	60 97	S		9 5 10 07	+1 53	11 60	10 63				
	3138	+ 21 44	S		57 33 01	+1 93	34 94	S		6 44 14	+1 60	45 74	10 80				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

*JUBBULPORE (E) Lat 23° 10′, Long 5h 19m 59s; AND KALIANPUR (W) Lat 24° 7′, Long 5h 10m 47s

Astronomical Date	Star		Transits Observed at E — By Burrard, with Telescope No 1					Transits Observed at W — By Lenox Conyngham, with Telescope No 2					Difference of Corrected Times (W − E)		Correction fo Rate of W Clock	Corrns. for Persl. Equations $B_N - C_N = -0^s.241$; $B_S - C_S = -0.241$	$\Delta L + \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1890		°			h m s	s	s			h m s	s	s	m s				
Feb 5	3162	+ 37 16	N	I P W	9 2 16 41	−1 69	14 72	N	I P W	9 11 26 75	−1 31	25 44	9 10 72				
	3204	+ 26 39	N	d c + 2 8	8 31 44	−1 65	29 79	N	d c + 1 5	17 41 89	−1 59	40 30	10 51	m s 9 10 580	+ 0 011	− 0 241	9 10 350
	3261	+ 36 53	N	b + 3 1 a + 10 1	17 45 67	−1 69	43 98	N	b − 1 5 a − 53 4	26 55 78	−1 32	54 46	10 48				
	3268	+ 36 19	N	s Q − 1 78	19 20 17	−1 68	18 49	N	s Q − 1 65	28 30 43	−1 33	29 10	10 61				
	3183	+ 25 38	S		9 5 3 16	−1 64	1 52	S		9 14 13 75	−1 62	12 13	9 10 61				
	3194	+ 25 39	S		7 26 32	−1 64	24 68	S		16 36 84	−1 61	35 23	10 55	m s 9 10 550	+ 0 011	− 0 241	9 10 320
	3250	+ 11 47	S		16 17 42	−1 60	15 82	S		25 28 22	−1 91	26 31	10 49				
Feb 6	3112	+ 34 20	N	I P W	8 52 17 37	+1 88	19 25	N	I P E	9 1 28 31	+1 53	29 84	9 10 59				
	3117	+ 22 29	N	d c + 2 8	53 13 33	+1 91	15 24	N	d c − 3 1	2 24 27	+1 53	25 80	10 56	m s 9 10 590	+ 0 009	− 0 241	9 10 358
	3123	+ 22 27	N	b + 1 9 a + 6 7	54 12 88	+1 91	14 79	N	b − 3 1 a − 0 5	3 23 87	+1 53	25 40	10 61				
	3144	+ 35 5	N	s Q + 1 79	58 40 39	+1 88	42 27	N	s Q + 1 69	7 51 34	+1 53	52 87	10 60				
	3104	+ 15 43	S		8 50 26 44	+1 92	28 36	S		8 59 37 43	+1 55	38 98	9 10 62				
	3107	+ 15 40	S		50 50 65	+1 92	52 57	S		9 0 1 60	+1 55	3 15	10 58	m s 9 10 648	+ 0 009	− 0 241	9 10 416
	3129	+ 18 30	S		55 57 27	+1 91	59 18	S		5 8 34	+1 55	9 89	10 71				
	3138	+ 21 44	S		57 31 44	+1 91	33 35	S		6 42 48	+1 55	44 03	10 68				
	3162	+ 37 16	N	s Q − 1 79	9 2 14 74	−1 71	13 03	N	s Q − 1 69	9 11 25 57	−1 87	23 70	9 10 67				
	3204	+ 26 39	N		8 29 62	−1 68	27 94	N		17 40 40	−1 85	38 55	10 61	m s 9 10 675	+ 0 009	− 0 241	9 10 443
	3261	+ 36 53	N		17 43 73	−1 70	42 03	N		26 54 65	−1 86	52 79	10 76				
	3268	+ 36 19	N		19 18 45	−1 70	16 75	N		28 29 27	−1 86	27 41	10 66				
	3250	+ 11 47	S		9 16 15 54	−1 66	13 88	S		9 25 26 46	−1 83	24 63	9 10 75	m s 9 10 750	+ 0 009	− 0 241	9 10 518

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

JUBBULPORE (E) Lat 23° 10′ Long 5h 19m 58s : AND KALIANPUR (W) Lat 24° 7′ Long 5h 10m 47s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham, with Telescope No 9): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrn. for Persl. Equations $B_E - C_E = -0.241$, $B_E - C_S = -0.241$	$\Delta L + \rho$
1890		° ′			h m s	s	s			h m s	s	s	m s				
Feb 7	3112	+ 34 20	N	I P E	8 52 16 63	+ 1 55	18 18	N	I P E	9 1 27 09	+ 1 60	28 69	9 10 51				
	3117	+ 22 29	N	d c − 4 4	53 12 30	+ 1 69	13 99	N	d c − 3 1	2 23 01	+ 1 61	24 62	10 63	m s 9 10 578	+ 0 007	− 0 241	9 10 344
	3123	+ 22 27	N	b + 1 6 a + 23 4	54 11 99	+ 1 69	13 68	N	b + 0 3 a + 1 7	3 22 60	+ 1 61	24 21	10 53				
	3144	+ 35 5	N	s Q + 1 75	58 39 53	+ 1 54	41 07	N	s Q + 1 68	7 50 11	+ 1 60	51 71	10 64				
	3104	+ 15 43	S		8 50 25 58	+ 1 76	27 34	S		8 59 36 20	+ 1 63	37 83	9 10 49				
	3129	+ 18 30	S		55 56 50	+ 1 73	58 23	S		9 5 7 11	+ 1 62	8 73	10 50	m s 9 10 510	+ 0 007	− 0 241	9 10 276
	3138	+ 21 44	S		57 30 62	+ 1 69	32 31	S		6 41 23	+ 1 62	42 85	10 54				
	3162	+ 37 16	N	s Q − 1 75	9 2 13 98	− 1 99	11 99	N	s Q − 1 68	9 11 24 29	− 1 77	22 52	9 10 53				
	3204	+ 26 39	N		8 28 80	− 1 86	26 94	N		17 39 14	− 1 75	37 39	10 45	m s 9 10 488	+ 0 007	− 0 241	9 10 254
	3261	+ 36 53	N		17 43 13	− 1 98	41 15	N		26 53 41	− 1 77	51 64	10 49				
	3268	+ 36 19	N		19 17 78	− 1 98	15 80	N		28 28 05	− 1 77	26 28	10 48				
	3176	+ 10 15	S		9 3 49 32	− 1 69	47 63	S		9 12 59 88	− 1 73	58 15	9 10 52				
	3194	+ 25 39	S		7 23 73	− 1 85	21 88	S		16 34 20	− 1 75	32 45	10 57	m s 9 10 517	+ 0 007	− 0 241	9 10 283
	3250	+ 11 47	S		16 14 75	− 1 70	13 05	S		25 25 24	− 1 73	23 51	10 46				
Feb 8	3112	+ 34 20	N	I P E	8 52 15 60	+ 1 57	17 17	N	I P E	9 1 26 11	+ 1 60	27 71	9 10 54				
	3117	+ 22 29	N	d c − 4 4	53 11 35	+ 1 77	13 12	N	d c − 3 1	2 22 06	+ 1 65	23 71	10 59	m s 9 10 565	+ 0 006	− 0 241	9 10 330
	3123	+ 22 27	N	b + 5 3 a + 35 1	54 10 97	+ 1 77	12 74	N	b + 0 8 a + 7 8	3 21 66	+ 1 65	23 31	10 57				
	3144	+ 35 5	N	s Q + 1 74	58 38 61	+ 1 56	40 17	N	s Q + 1 70	7 49 13	+ 1 60	50 73	10 56				
	3104	+ 15 43	S		8 50 24 46	+ 1 87	26 33	S		8 59 35 22	+ 1 68	36 90	9 10 57				
	3129	+ 18 30	S		55 55 34	+ 1 83	57 17	S		9 5 6 14	+ 1 67	7 81	10 64	m s 9 10 600	+ 0 006	− 0 241	9 10 365
	3138	+ 21 44	S		57 29 53	+ 1 78	31 31	S		6 40 24	+ 1 66	41 90	10 59				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

JUBBULPORE (E) *Lat* 23° 10', *Long* 5h 19m 58s ; AND KALIANPUR (W) *Lat* 24° 7', *Long* 5h 10m 47s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard, with Telescope No 1: Star's Aspect	In strumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox-Conyngham with Telescope No 2: Star's Aspect	In strumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $B_E - C_E = -0^s\ 241$, $B_W - C_W = -0\ 241$	$\Delta L + \rho$
1890		° '			h m s	s	s			h m s	s	s	m s				
Feb 8	3162	+ 37 16	N	*I P E*	9 2 13 08	−1 95	11 13	N	*I P E*	9 11 23 39	−1 82	21 57	9 10 44	m s 9 10 488	+ 0 006	− 0 241	9 10 253
	3204	+ 26 39	N	d c − 4 4	8 27 72	−1 77	25 95	N	d c − 3 1	17 38 23	−1 77	36 46	10 51				
	3261	+ 36 53	N	b + 5 3 a + 35 1	17 42 14	−1 95	40 19	N	b + 0 8 a + 7 8	26 52 47	−1 82	50 65	10 46				
	3268	+ 36 19	N	s Q − 1 74	19 16 72	−1 94	14 78	N	s Q − 1 70	28 27 14	−1 82	25 32	10 54				
	3176	+ 10 15	S		9 3 48 23	−1 54	46 69	S		9 12 58 90	−1 71	57 19	9 10 50	m s 9 10 553	+ 0 006	− 0 241	9 10 318
	3188	+ 25 38	S		4 59 57	−1 76	57 81	S		14 10 11	−1 76	8 35	10 54				
	3194	+ 25 39	S		7 22 62	−1 76	20 86	S		16 33 26	−1 77	31 49	10 63				
	3250	+ 11 47	S		16 13 54	−1 56	11 98	S		25 24 23	−1 71	22 52	10 54				
Feb 9	3112	+ 34 20	N	*I P W*	8 52 14 53	+1 53	16 06	N	*I P W*	9 1 25 00	+1 71	26 71	9 10 65	m s 9 10 680	+ 0 007	− 0 241	9 10 446
	3117	+ 22 29	N	d c + 2 8	53 10 19	+1 77	11 96	N	d c + 1 5	2 20 98	+1 71	22 69	10 73				
	3123	+ 22 27	N	b − 1 0 a + 42 6	54 9 87	+1 77	11 64	N	b − 0 6 a − 1 1	3 20 62	+1 71	22 33	10 69				
	3144	+ 36 5	N	s Q + 1 71	58 37 59	+1 52	39 11	N	s Q + 1 68	7 48 05	+1 71	49 76	10 65				
	3104	+ 15 43	S		8 50 23 36	+1 89	25 25	S		8 59 34 15	+1 70	35 85	9 10 60	m s 9 10 683	+ 0 007	− 0 241	9 10 449
	3107	+ 15 40	S		50 47 47	+1 89	49 36	S		59 58 27	+1 70	59 97	10 61				
	3129	+ 18 30	S		55 54 24	+1 84	56 08	S		9 5 5 11	+1 71	6 82	10 74				
	3138	+ 21 44	S		57 28 39	+1 79	30 18	S		6 39 25	+1 71	40 96	10 78				
	3162	+ 37 16	N	s Q − 1 71	9 2 11 90	−1 95	9 95	N	s Q − 1 68	9 11 22 25	−1 65	20 60	9 10 65	m s 9 10 648	+ 0 007	− 0 241	9 10 414
	3204	+ 26 39	N		8 26 57	−1 73	24 84	N		17 37 17	−1 66	35 51	10 67				
	3261	+ 36 53	N		17 41 01	−1 94	39 07	N		26 51 33	−1 65	49 68	10 61				
	3268	+ 36 19	N		19 15 63	−1 93	13 70	N		28 26 01	−1 65	24 36	10 66				
	3176	+ 10 15	S		9 3 46 97	−1 45	45 52	S		9 12 57 81	−1 67	56 14	9 10 62	m s 9 10 673	+ 0 007	− 0 241	9 10 439
	3188	+ 25 38	S		4 58 36	−1 71	56 65	S		14 9 01	−1 65	7 36	10 71				
	3194	+ 25 39	S		7 21 49	−1 71	19 78	S		16 32 13	−1 65	30 48	10 70				
	3250	+ 11 47	S		16 12 42	−1 48	10 94	S		25 23 27	−1 67	21 60	10 66				

OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL — ρ

MOOLTAN (E) *Lat 30° 11 Long 4h 45m 56s*: AND QUETTA (W) *Lat 30° 12′ Long 4h 28m 12s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Persl Equations $B_N - C_N = -0^s.241$, $B_S - C_S = -0.241$	ΔL − ρ
1890					h m s	s	s			h m s	s	s	m s	m s			
Mar 24	3607	+ 41 0	N	I P E	10 26 59 10	+ 1 52	60 62	N	I P E	10 44 41 81	+ 2 43	44 24	17 43 62	17 43 753	− 0 105	− 0 241	17 43 407
	3625	+ 36 54	N	d c − 4 3	30 12 78	+ 1 49	14 27	N	d c + 6 2	47 55 84	+ 2 29	58 13	43 86				
	3633	+ 34 39	N	b − 2 1, a − 17 8	31 48 05	+ 1 47	49 52	N	b + 6 0, a − 53 6	49 31 09	+ 2 21	33 30	43 78				
				Q + 1 61 s					Q + 1 77 s								
	3621	+ 7 31	S		10 29 13 81	+ 1 32	15 13	S		10 46 57 30	+ 1 57	58 87	17 43 74	17 43 740	− 0 105	− 0 241	17 43 394
	4010	+ 38 34	N	Q − 1 61 s	11 46 52 46	− 1 72	50 74	N	Q − 1 77 s	12 4 35 71	− 1 19	34 52	17 43 78	17 43 780	− 0 105	− 0 241	17 43 434
	4018	+ 41 32	N		48 21 86	− 1 69	20 17	N		6 4 98	− 1 08	3 90	43 73				
	4057	+ 43 39	N		56 45 82	− 1 67	44 15	N		14 28 99	− 1 01	27 98	43 83				
	4027	+ 9 3	S		11 49 38 47	− 1 90	36 57	S		12 7 22 26	− 1 94	20 32	17 43 75	17 43 748	− 0 105	− 0 241	17 43 402
	4052	+ 7 14	S		55 28 10	− 1 91	26 19	S		13 11 91	− 1 98	9 93	43 74				
	4066	+ 22 4	S		58 52 69	− 1 82	50 87	S		16 36 28	− 1 66	34 62	43 75				
	4072	+ 9 21	S		59 50 39	− 1 89	48 50	S		17 34 18	− 1 93	32 25	43 75				
Mar 27	3607	+ 41 0	N	I P W	10 27 23 77	+ 1 74	25 51	N	I P E	10 45 7 08	+ 2 28	9 36	17 43 85	17 43 850	− 0 104	− 0 241	17 43 505
	3625	+ 36 54	N	d c + 2 7	30 37 66	+ 1 68	39 34	N	d c + 6 2	48 21 02	+ 2 18	23 20	43 86				
	3633	+ 34 39	N	b − 3 1, a − 25 2	32 12 83	+ 1 65	14 48	N	b + 4 4, a − 33 8	49 56 18	+ 2 14	58 32	43 84				
				Q + 1 61 s					Q + 1 78 s								
	3579	+ 14 54	S		10 23 30 62	+ 1 45	32 07	S		10 41 14 07	+ 1 81	15 88	17 43 81	17 43 843	− 0 104	− 0 241	17 43 498
	3592	+ 2 4	S		24 38 51	+ 1 34	39 85	S		42 22 04	+ 1 65	23 69	43 84				
	3621	+ 7 31	S		29 38 68	+ 1 39	40 07	S		47 22 22	+ 1 72	23 94	43 87				
	3643	+ 16 42	S		30 35 53	+ 1 46	36 99	S		51 19 00	+ 1 84	20 84	43 85				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

MOOLTAN (E) *Lat 30° 11, Long 4h 45m 56s* AND QUETTA (W) *Lat 30° 12' Long 4h 28m 12s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard, with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $B_N - C_N = -0^s 241$ $B_S - C_S = -0\ 241$	$\Delta L - \rho$
1890		°			h m s	s	s			h m s	s	s	m s				
Mar 27	4066	+ 22 4	S	*I P W*	11 59 17 61	−1 70	15 91	S	*I P E*	12 16 61 21	−1 63	59 58	17 43 67	m s 17 43 650	− 0 104	− 0 241	17 43 305
	4072	+ 9 21	S	d c + 2 7 b − 3 1 a −25 2 s Q − 1 61	12 0 15 36	−1 82	13 54	S	d c + 6 2 b + 4 4 a −33 8 s Q − 1 78	17 58 99	−1 82	57 17	43 63				
Mar 28	3643	+ 16 42	S	*I P W* d c + 2 7 b − 2 7 a −25 4 s Q + 1 61	10 33 43 53	+1 47	45 00	S	*I P W* d c − 7 8 b − 2 7 a −34 8 s Q + 1 74	10 51 27 64	+1 31	28 95	17 43 95	m s 17 43 950	− 0 103	− 0 241	17 43 606
	4010	+ 38 34	N	s Q − 1 61	11 47 25 33	−1 50	23 83	N	s Q − 1 74	12 5 9 62	−1 89	7 73	17 43 90	m s 17 43 873	− 0 103	− 0 241	17 43 529
	4018	+ 41 32	N		48 54 77	−1 46	53 31	N		6 38 96	−1 84	37 12	43 81				
	4057	+ 43 39	N		57 18 72	−1 43	17 29	N		15 3 01	−1 81	1 20	43 91				
	4059	+ 43 43	N		57 41 30	−1 42	39 88	N		15 25 56	−1 81	23 75	43 87				
	4027	+ 9 3	S		11 50 11 46	−1 82	9 64	S		12 7 55 73	−2 27	53 46	17 43 82	m s 17 43 788	− 0 103	− 0 241	17 43 444
	4052	+ 7 14	S		55 61 26	−1 83	59 43	S		13 45 42	−2 29	43 13	43 70				
	4066	+ 22 4	S		59 25 65	−1 69	23 96	S		17 9 92	−2 11	7 81	43 85				
	4072	+ 9 21	S		12 0 23 41	−1 82	21 59	S		18 7 63	−2 26	5 37	43 78				
Mar 30	3572	+ 37 16	N	*I P E*	10 22 30 95	+1 51	32 46	N	*I P W*	10 40 14 52	+1 67	16 19	17 43 73	m s 17 43 733	− 0 103	− 0 241	17 43 389
	3607	+ 41 0	N	d c − 4 3 b − 3 0 a −29 1	27 48 51	+1 55	50 06	N	d c − 7 8 b − 4 2 a −28 1	45 32 02	+1 72	33 74	43 68				
	3625	+ 36 54	N		31 2 33	+1 51	3 84	N		48 45 95	+1 66	47 61	43 77				
	3633	+ 34 39	N	s Q + 1 61	32 37 60	+1 47	39 07	N	s Q + 1 91	50 21 17	+1 65	22 82	43 75				
	3579	+ 14 54	S		10 23 55 32	+1 26	56 58	S		10 41 38 83	+1 47	40 30	17 43 72	m s 17 43 705	− 0 103	− 0 241	17 43 361
	3592	+ 2 4	S		25 3 22	+1 14	4 36	S		42 46 79	+1 36	48 15	43 79				
	3621	+ 7 31	S		30 3 49	+1 20	4 69	S		47 46 91	+1 40	48 31	43 62				
	3643	+ 16 42	S		34 0 25	+1 28	1 53	S		51 43 74	+1 48	45 22	43 69				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

MOOLTAN (E) *Lat 30° 11 Long 4h 43m 56s*: AND QUETTA (W) *Lat 30° 12′ Long 4h 28m 19s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Persl Equations $B_W - C_E = -0.241$, $B_E - C_W = -0.241$	$\Delta L - \rho$
1890					h m s	s	s			h m s	s	s	m s	m s			
Mar 30	4010	+ 38 34	N	I P E	11 47 41 92	−1 70	40 22	N	I P W	12 5 26 13	−2 13	24 00	17 43 78	17 43 833	− 0 103	− 0 241	17 43 489
	4018	+ 41 32	N	d c − 4 3	49 11 30	−1 66	9 64	N	d c − 7 8	6 55 51	−2 09	53 42	43 78				
	4057	+ 43 39	N	b − 3 0 a − 29 1	57 35 22	−1 62	33 60	N	b − 4 2 a − 28 1	15 19 53	−2 08	17 45	43 85				
	4059	+ 43 43	N	s Q − 1 61	57 57 77	−1 62	56 15	N	s Q − 1 91	15 42 14	−2 07	40 07	43 92				
	4027	+ 9 3	S		11 50 28 08	2 01	26 07	S		12 8 12 22	−2 41	9 81	17 43 74	17 43 750	− 0 103	− 0 241	17 43 406
	4052	+ 7 14	S		56 17 79	−2 03	15 76	S		13 61 96	−2 43	59 53	43 77				
	4066	+ 22 4	S		59 42 20	−1 89	40 32	S		17 26 39	−2 30	24 09	43 77				
	4072	+ 9 21	S		12 0 40 00	−2 01	37 99	S		18 24 12	−2 41	21 71	43 72				
Mar 31	3572	+ 31 16	N	I P E	10 22 38 93	+1 52	40 45	N	I P W	10 40 24 47	−0 27	24 20	17 43 75	17 43 743	− 0 102	− 0 241	17 43 400
	3607	+ 41 0	N	d c − 4 3	27 56 48	+1 58	58 06	N	d c − 7 8	45 42 04	−0 23	41 81	43 75				
	3625	+ 36 54	N	b − 3 1 a − 34 0	31 10 39	+1 51	11 90	N	b − 4 5 a − 23 1	48 55 92	−0 27	55 65	43 76				
	3633	+ 34 39	N	s Q + 1 61	32 45 63	+1 48	47 11	N	s Q 0 00	50 31 11	−0 28	30 83	43 72				
	3579	+ 14 54	S		10 24 3 40	+1 23	4 63	S		10 41 48 80	−0 42	48 38	17 43 75	17 43 ,45	− 0 102	− 0 241	17 43 402
	3592	+ 2 4	S		25 11 28	+1 09	12 37	S		42 56 70	−0 50	56 20	43 83				
	3621	+ 7 35	S		30 11 53	+1 15	12 68	S		47 56 87	−0 47	56 40	43 72				
	3643	+ 16 42	S		34 8 37	+1 25	9 62	S		51 53 71	−0 41	53 30	43 68				
	4010	+ 38 34	N	s Q − 1 61	11 47 49 96	−1 68	48 28	N	s Q 0 00	12 5 32 31	−0 25	32 06	17 43 78	17 43 810	− 0 102	− 0 241	17 43 467
	4018	+ 41 32	N		49 19 34	−1 63	17 71	N		7 1 68	−0 22	1 46	43 75				
	4057	+ 43 39	N		57 43 30	−1 59	41 71	N		15 25 71	−0 21	25 50	43 79				
	4059	+ 43 43	N		58 5 69	−1 58	4 11	N		15 48 24	−0 21	48 03	43 92				
	4027	+ 9 3	S		11 50 36 16	−2 06	34 10	S		12 8 18 28	−0 47	17 81	17 43 71	17 43 ,28	− 0 102	− 0 241	17 43 385
	4052	+ 7 14	S		56 25 82	−2 07	23 75	S		14 7 96	−0 47	7 49	43 74				
	4066	+ 22 4	S		59 50 31	−1 90	48 41	S		17 32 50	−0 38	32 12	43 71				
	4072	+ 9 21	S		12 0 48 06	−2 06	46 00	S		18 30 22	−0 47	29 75	43 75				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MOOLTAN (E) *Lat* 30° 11 *Long* 4ʰ 45ᵐ 56 ; AND QUETTA (W) *Lat* 30° 12′, *Long* 4ʰ 28ᵐ 12ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl Equations $B_N - C_N = -0^s 241$, $B_S - C_S = -0\ 241$	$\Delta L + \rho$
1890		° ′			h m s	s	s			h m s	s	s	m s				
Mar 24	3765	+ 39 48	N	I P E	10 36 42 30	+ 1 51	43 81	N	I P E	10 54 25 43	+ 2 38	27 81	17 44 00	m s 17 43 938	− 0 091	− 0 241	17 43 606
	3784	+ 38 50	N	d c − 4 3	40 26 06	+ 1 51	27 5,	N	d c + 6 2	58 9 23	+ 2 35	11 58	44 01				
	3797	+ 26 8	N	b − 2 1 a − 17 8	43 11 99	+ 1 42	13 41	N	b + 6 0 a − 53 6	11 0 55 21	+ 1 97	57 18	43 77				
	3811	+ 36 54	N	s Q + 1 61	45 17 97	+ 1 49	19 46	N	s Q + 1 77	3 1 14	+ 2 29	3 43	43 97				
	3776	+ 20 46	S		10 38 29 05	+ 1 39	30 44	S		10 56 12 68	+ 1 85	14 53	17 44 09	m s 1, 43 9,8	− 0 091	− 0 241	17 43 646
	3788	+ 7 56	S		41 22 24	+ 1 32	23 56	S		59 5 99	+ 1 58	7 57	44 01				
	3824	+ 15 0	S		47 59 43	+ 1 35	60 78	S		11 5 42 98	+ 1 ,1	44 69	43 91				
	3834	+ 21 8	S		50 17 32	+ 1 39	18 71	S		8 0 75	+ 1 86	2 61	43 90				
	3851	+ 32 9	N	s Q − 1 61	10 54 24 12	− 1 76	22 36	N	s Q − 1 77	11 12 7 52	− 1 40	6 12	17 43 76	m s 17 43 843	− 0 091	− 0 241	17 43 511
	3868	+ 44 5	N		58 52 67	− 1 67	51 00	N		16 35 86	− 1 00	34 86	43 86				
	3905	+ 39 56	N		11 5 13 97	− 1 71	12 26	N		22 57 30	− 1 16	56 14	43 88				
	3918	+ 43 47	N		6 39 32	− 1 67	37 65	N		24 22 53	− 1 01	21 52	43 87				
	3845	+ 13 27	S		10 52 18 04	− 1 88	16 16	S		11 10 1 96	− 1 85	0 11	17 43 95	m s 17 43 863	− 0 091	− 0 241	17 43 531
	3862	+ 6 38	S		57 32 98	− 1 91	31 07	S		15 16 9	− 1 99	14 96	43 89				
	3877	+ 11 8	S		11 0 16 59	− 1 89	14 70	S		17 60 41	− 1 90	58 51	43 81				
	3886	+ 17 4	S		1 57 45	− 1 85	55 60	S		19 41 16	− 1 76	39 40	43 80				
Mar 27	3765	+ 39 48	N	I P W	10 37 3 71	+ 1 72	5 43	N	I P E	10 54 47 12	+ 2 26	49 38	17 43 95	m s 1, 43 913	− 0 088	− 0 241	17 43 604
	3784	+ 38 50	N	d c + 2 7	40 47 51	+ 1 71	49 22	N	d c + 6 2	58 30 88	+ 2 24	33 12	43 90				
	3797	+ 26 8	N	b − 3 1 a − 25 2	43 33 32	+ 1 55	34 87	N	b + 4 4 a − 33 8	11 1 16 84	+ 1 98	18 82	43 98				
	3811	+ 36 54	N	s Q + 1 61	45 39 36	+ 1 68	41 04	N	s Q + 1 78	3 22 79	+ 2 18	24 97	43 93				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MOOLTAN (E) *Lat 30° 11 Long 4h 45m 56s*; AND QUETTA (W) *Lat 30° 12' Long 4h 28m 12s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl Equations $B_N - C_N = -0^s 241$, $B_S - C_S = -0 241$	$\Delta L + \rho$
1890		°			h m s	s	s			h m s	s	s	m s				
Mar. 27	3776	+ 20 46	S	*I P W*	10 38 50 61	+ 1 50	52 11	S	*I P E*	10 56 34 12	+ 1 90	36 02	17 43 91				
	3788	+ 7 56	S	d c + 2 7	41 43 78	+ 1 39	45 17	S	d c + 6 2	59 27 39	+ 1 72	29 11	43 94	m s 17 43 908	− 0 088	− 0 241	17 43 579
	3824	+ 15 0	S	b − 3 1 a − 25 2	48 20 91	+ 1 45	22 36	S	b + 4 4 a − 33 8	11 6 4 38	+ 1 81	6 19	43 83				
	3834	+ 21 8	S	s Q + 1 61	50 38 76	+ 1 50	40 26	S	s Q + 1 78	8 22 31	+ 1 90	24 1	43 95				
	3851	+ 32 9	N	s Q − 1 61	10 54 45 42	− 1 60	43 82	N	s Q − 1 78	11 12 29 12	− 1 47	27 65	17 43 83				
	3868	+ 44 5	N		59 13 99	− 1 43	12 56	N		16 57 62	− 1 21	56 41	43 85	m s 17 43 863	− 0 088	− 0 241	17 43 534
	3905	+ 39 56	N		11 5 35 35	− 1 50	33 85	N		23 18 97	− 1 30	17 67	43 82				
	3913	+ 43 47	N		6 60 59	− 1 44	59 15	N		24 44 31	− 1 21	43 10	43 95				
	3845	+ 13 27	S		10 52 39 60	− 1 79	37 81	S		11 10 23 39	− 1 76	21 63	17 43 82				
	3862	+ 6 38	S		57 54 50	− 1 84	52 66	S		15 38 27	− 1 85	36 42	43 76	m s 17 43 810	− 0 088	− 0 241	17 43 481
	3877	+ 11 8	S		11 0 38 03	− 1 81	36 22	S		18 21 87	− 1 80	20 07	43 85				
	3886	+ 17 4	S		2 18 88	− 1 75	17 13	S		20 2 65	− 1 71	0 94	43 81				
Mar 28	3765	+ 39 48	N	*I P W*	10 37 10 44	+ 1 73	12 17	N	*I P W*	10 54 54 41	+ 1 60	56 07	17 43 90				
	3784	+ 38 50	N	d c + 2 7	40 54 19	+ 1 72	55 91	N	d c − 7 8	58 38 26	+ 1 59	39 85	43 94	m s 17 43 883	− 0 087	− 0 241	17 43 555
	3797	+ 26 8	N	b − 2 7 a − 25 4	43 40 10	+ 1 56	41 66	N	b − 2 7 a − 34 8	11 1 24 10	+ 1 42	25 52	43 86				
	3811	+ 36 54	N	s Q + 1 61	45 46 11	+ 1 69	47 80	N	s Q + 1 74	3 30 08	+ 1 55	31 63	43 83				
	3776	+ 20 46	S		10 38 57 35	+ 1 51	58 86	S		10 56 41 48	+ 1 35	42 83	17 43 97				
	3788	+ 7 56	S		41 50 56	+ 1 39	51 95	S		59 34 59	+ 1 20	35 79	43 84	m s 17 43 908	− 0 087	− 0 241	17 4 680
	3824	+ 15 0	S		48 27 68	+ 1 46	29 14	S		11 6 11 68	+ 1 29	12 97	43 83				
	3834	+ 21 8	S		50 45 42	+ 1 51	46 93	S		8 29 56	+ 1 36	30 92	43 99				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MOOLTAN (E) *Lat 30° 11, Long 4h 45m 56s*: AND QUETTA (W) *Lat 30° 12', Long 4h 28m 12s*

Astronomical Date	Star		Transits Observed at E — *By Burrard, with Telescope No 1*					Transits Observed at W — *By Lenox Conyngham with Telescope No 2*					Difference of Corrected Times (W − E)		Correction for Rate of W Clock	Corrns for Persl Equations $B_N - C_N = -0.241$ $B_S - C_S = -0.241$	$\Delta L + \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1890					h m s	s	s			h m s	s	s	m s				
Mar 28	3851	+ 32 9	N	I P W	10 54 52 21	− 1 59	50 62	N	I P W	11 12 36 37	− 1 99	34 38	17 43 76				
	3868	+ 44 5	N	d c + 2 7	59 20 71	− 1 42	19 29	N	d c − 7 8	17 4 99	− 1 80	3 19	43 90	m s 17 43 883	− 0 087	− 0 241	17 43 555
	3905	+ 39 56	N	b − 2 7 a − 25 4	11 5 41 97	− 1 49	40 48	N	b − 2 7 a − 34 8	23 26 33	− 1 88	24 45	43 97				
	3918	+ 43 47	N	s Q − 1 61	7 7 31	− 1 42	5 89	N	s Q − 1 74	24 51 60	− 1 81	49 79	43 90				
	3845	+ 13 27	S		10 54 46 24	− 1 78	44 46	S		11 10 30 56	− 2 21	28 35	17 43 89				
	3862	+ 6 38	S		57 61 19	− 1 84	59 35	S		15 45 48	− 2 29	43 19	43 84	m s 17 43 843	− 0 087	− 0 241	17 43 515
	3877	+ 11 8	S		11 0 44 81	− 1 80	43 01	S		18 29 06	− 2 24	26 82	43 81				
	3886	+ 17 4	S		2 25 58	− 1 74	23 84	S		20 9 83	− 2 16	7 67	43 83				
Mar 30	3765	+ 39 48	N	I P E	10 37 24 53	+ 1 53	26 06	N	I P W	10 55 8 29	+ 1 70	9 99	17 43 93				
	3784	+ 38 50	N	d c − 4 3	41 8 30	+ 1 53	9 83	N	d c − 7 8	58 52 02	+ 1 69	53 71	43 88	m s 17 43 850	− 0 089	− 0 241	17 43 520
	3797	+ 26 8	N	b − 3 0 a − 29 1	43 54 18	+ 1 38	55 56	N	b − 4 2 a − 28 1	11 1 37 18	+ 1 57	39 35	43 79				
	3811	+ 36 54	N	s Q + 1 61	46 0 17	+ 1 51	1 68	N	s Q + 1 91	3 43 82	+ 1 66	45 48	43 80				
	3776	+ 20 46	S		10 39 11 49	+ 1 33	12 82	S		10 56 55 13	+ 1 51	56 64	17 43 82				
	3788	+ 7 56	S		42 4 65	+ 1 20	5 85	S		59 48 31	+ 1 40	49 71	43 86	m s 17 43 855	− 0 089	− 0 241	17 43 525
	3824	+ 15 0	S		48 41 75	+ 1 26	43 01	S		11 6 25 42	+ 1 47	26 89	43 88				
	3834	+ 21 8	S		50 59 62	+ 1 33	60 95	S		8 43 30	+ 1 51	44 81	43 86				
	3851	+ 32 9	N	s Q − 1 61	10 55 6 39	− 1 77	4 62	N	s Q − 1 91	11 12 50 55	− 2 20	48 35	17 43 73				
	3868	+ 44 5	N		59 34 91	− 1 61	33 30	N		17 19 14	− 2 07	17 07	43 77	m s 17 43 835	− 0 089	− 0 241	17 43 505
	3905	+ 39 56	N		11 5 56 14	− 1 69	54 45	N		23 40 50	− 2 12	38 38	43 93				
	3918	+ 43 47	N		7 21 44	− 1 62	19 82	N		25 5 80	− 2 07	3 73	43 91				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

MOOLTAN (E) *Lat 30° 11 Long 4h 45m 56s* AND QUETTA (W) *Lat 30° 12′, Long 4h 28m 12s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Pers'l Equations $B_E - C_E = -0\ 241$, $B_S - C_S = -0\ 241$	$\Delta L + \rho$
1890					h m s	s	s			h m s	s	s	m s				
Mar 30	3845	+ 13 27	S	*I P E*	10 52 60 37	− 1 97	58 40	S	*I P W*	11 10 44 64	− 2 37	42 27	17 43 87				
	3862	+ 6 38	S	d c − 4 3	58 15 34	− 2 03	13 31	S	d c − , 8	15 59 60	− 2 43	5, 17	43 86	m s 17 43 814	− 0 089	− 0 241	17 43 484
	3877	+ 11 8	S	b − 3 0 a − 29 1	11 0 58 95	− 1 99	56 96	S	b − 4 2 a − 28 1	18 43 06	− 2 39	40 67	43 71				
				s Q − 1 61					s Q − 1 91								
Mar 31	3784	+ 38 50	N	*I P E*	10 41 15 41	+ 1 5,	16 96	N	*I P W*	10 59 1 09	− 0 25	0 84	17 43 88				
	3797	+ 26 8	N	d c − 4 3	44 1 34	+ 1 36	2 ,0	N	d c − 7 8	11 1 46 91	− 0 34	46 57	43 87	m s 17 43 897	− 0 090	− 0 241	17 43 566
	3811	+ 36 54	N	b − 3 1 a − 34 0	46 7 24	+ 1 51	8 75	N	b − 4 5 a − 23 1	3 52 96	− 0 27	52 69	43 94				
				s Q + 1 61					s Q 0 00								
	3776	+ 20 46	S		10 39 18 59	+ 1 31	19 90	S		10 57 4 17	− 0 39	3 78	17 43 88				
	3788	+ 7 56	S		42 11 74	+ 1 16	12 90	S		59 57 31	− 0 47	56 84	43 94	m s 17 43 913	− 0 090	− 0 241	17 43 582
	3824	+ 15 0	S		48 48 ,9	+ 1 23	50 02	S		11 6 34 40	− 0 42	33 98	43 96				
	3834	+ 21 8	S		51 6 71	+ 1 31	8 02	S		8 52 28	− 0 39	51 89	43 87				
	3851	+ 32 9	N	s Q − 1 61	10 55 13 51	− 1 77	s 11 74	N	s Q 0 00	11 12 55 75	− 0 31	55 44	17 43 70				
	3868	+ 44 5	N		59 41 85	− 1 57	40 28	N		17 24 35	− 0 21	24 14	43 86	m s 17 43 848	− 0 090	− 0 241	17 43 517
	3905	+ 39 56	N		11 6 3 29	− 1 66	1 63	N		23 45 68	− 0 25	45 43	43 80				
	3918	+ 43 47	N		7 28 37	− 1 58	26 79	N		25 11 03	− 0 21	10 82	44 03				
	3845	+ 13 27	S		10 53 7 58	− 2 00	5 58	S		11 10 49 84	− 0 43	49 41	17 43 83				
	3862	+ 6 38	S		58 22 56	− 2 08	20 48	S		16 4 64	− 0 48	4 16	43 68	m s 17 43 784	− 0 090	− 0 241	17 43 453
	3877	+ 11 8	S		11 1 5 98	− 2 04	3 94	S		18 48 23	− 0 45	47 78	43 84				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

KARACHI (E) *Lat* 24° 51′, *Long* 4h 28m 13s·1 AND QUETTA (W) *Lat* 30° 12′, *Long* 4h 28m 19s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $B_E - C_E = -0^s.241$, $B_S - C_S = -0.241$	$\Delta L - \rho$
1890					h m s	s	s			h m s	s	s	m s				
Apr 7	3952	+ 44 14	N	*I P E*	11 32 7 12	+ 2 96	10 08	N	*I P E*	11 32 9 52	+ 2 29	11 81	0 1 73	m s 0 1 710	+ 0 002	− 0 241	0 1 471
	3965	+ 34 50	N	d c − 1 1	34 54 22	+ 2 35	56 57	N	d c + 5 4	34 55 99	+ 2 20	58 19	1 62				
	3973	+ 42 20	N	b + 0 4 a − 108 5	37 26 14	+ 2 82	28 96	N	b + 4 1 a − 10 3	37 28 43	+ 2 27	30 70	1 74				
	3981	+ 48 23	N	s Q + 1 85	39 52 54	+ 3 28	55 82	N	s Q + 1 90	39 55 23	+ 2 34	57 57	1 75				
	3919	+ 14 59	S		11 25 43 59	+ 1 40	44 99	S		11 25 44 70	+ 2 08	46 78	0 1 79	m s 0 1 730	+ 0 002	− 0 241	0 1 491
	3932	+ 17 24	S		28 38 30	+ 1 50	39 80	S		28 39 41	+ 2 09	41 50	1 70				
	3940	+ 6 43	S		30 34 64	+ 1 08	35 72	S		30 35 39	+ 2 03	37 42	1 70				
	3970	+ 12 54	S		36 2 30	+ 1 31	3 61	S		36 3 29	+ 2 05	5 34	1 73				
	4235	+ 41 57	N	s Q − 1 85	12 28 13 13	− 0 92	12 21	N	s Q − 1 90	12 28 15 43	− 1 54	13 89	0 1 68	m s 0 1 700	+ 0 002	− 0 241	0 1 461
	4258	+ 41 29	N		33 10 65	− 0 94	9 71	N		33 12 96	− 1 54	11 42	1 71				
	4282	+ 44 42	N		38 57 40	− 0 71	56 69	N		38 59 96	− 1 51	58 45	1 76				
	4287	+ 46 2	N		39 39 52	− 0 61	38 91	N		39 42 05	− 1 49	40 56	1 65				
	4228	+ 10 54	S		12 27 11 95	− 2 47	9 48	S		12 27 12 86	− 1 76	11 10	0 1 62	m s 0 1 625	+ 0 002	− 0 241	0 1 386
	4292	+ 12 34	S		41 24 41	− 2 40	22 01	S		41 25 39	− 1 75	23 64	1 63				
Apr 8	3952	+ 44 14	N	*I P W*	11 32 2 09	+ 2 88	4 97	N	*I P E*	11 32 4 39	+ 2 33	6 72	0 1 75	m s 0 1 790	+ 0 002	− 0 241	0 1 551
	3965	+ 34 50	N	d c − 0 5	34 49 04	+ 2 29	51 33	N	d c + 5 4	34 50 88	+ 2 24	53 12	1 79				
	3973	+ 42 20	N	b − 1 3 a − 108 5	37 21 04	+ 2 74	23 78	N	b + 4 7 a − 12 2	37 23 31	+ 2 31	25 62	1 84				
	3981	+ 48 23	N	s Q + 1 81	39 47 47	+ 3 21	50 68	N	s Q + 1 93	39 50 07	+ 2 39	52 46	1 78				
	3970	+ 12 54	S		11 35 57 21	+ 1 25	58 46	S		11 35 58 25	+ 2 07	60 32	0 1 86	m s 0 1 860	+ 0 002	− 0 241	0 1 621

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

KARACHI (E) *Lat* 24° 51′ *Long* 4h 28m 13s AND QUETTA (W) *Lat* 30° 12′ *Long* 4h 28m 12s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham, with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Persl Equations $B_E - C_E = -0^s\ 241$, $B_W - C_W = -0\ 241$	$\Delta L - \rho$
1890					h m s	s	s			h m s	s	s	m s				
Apr 8	4235	+ 41 57	N	*I P W*	12 28 7 87	−0 92	6 95	N	*I P E*	12 28 10 49	−1 56	8 93	0 1 98	m s 0 1 940	+ 0 002	− 0 241	0 1 701
	4258	+ 41 29	N	d c − 0 5 b − 1 3 a −108 5 s Q − 1 81	33 5 49	−0 93	4 56	N	d c + 5 4 b + 4 7 a −12 2 s Q − 1 93	33 8 02	−1 56	6 46	1 90				
	4228	+ 10 54	S		12 27 6 78	−2 45	4 33	S		12 27 7 93	−1 80	6 13	0 1 80	m s 0 1 820	+ 0 002	− 0 241	0 1 581
	4292	+ 12 34	S		41 19 29	−2 38	16 91	S		41 20 54	−1 79	18 75	1 84				
Apr 9	3952	+ 44 14	N	*I P W*	11 31 57 02	+2 87	59 89	N	*I P W*	11 31 59 87	+1 93	61 80	0 1 91	m s 0 1 878	+ 0 002	− 0 241	0 1 639
	3965	+ 34 50	N	d c − 0 5 b − 0 3 a −106 2	34 44 10	+2 29	46 39	N	d c − 7 0 b − 6 3 a −53 3	34 46 54	+1 69	48 23	1 84				
	3973	+ 42 20	N		37 16 08	+2 74	18 82	N		37 18 85	+1 87	20 72	1 90				
	3981	+ 48 23	N	s Q + 1 80	39 42 49	+3 20	45 69	N	s Q + 1 93	39 45 50	+2 05	47 55	1 86				
	3919	+ 14 59	S		11 25 33 53	+1 36	4 89	S		11 25 35 36	+1 30	36 66	0 1 77	m s 0 1 815	+ 0 002	− 0 241	0 1 576
	3932	+ 17 24	S		28 28 26	+1 46	29 72	S		28 30 16	+1 35	31 51	1 79				
	3940	+ 6 43	S		30 24 57	+1 04	25 61	S		30 26 32	+1 16	27 48	1 87				
	3970	+ 12 54	S		35 52 25	+1 27	53 52	S		35 54 08	+1 27	55 35	1 83				
	4230	+ 41 57	N	s Q − 1 80	12 28 3 00	−0 90	2 10	N	s Q − 1 93	12 28 6 03	−2 00	4 03	0 1 93	m s 0 1 898	+ 0 002	− 0 241	0 1 659
	4258	+ 41 29	N		32 60 61	−0 91	59 70	N		33 3 53	−2 01	1 52	1 82				
	4282	+ 44 42	N		38 47 28	−0 69	46 59	N		38 50 44	−1 92	48 52	1 93				
	4287	+ 46 2	N		39 29 34	−0 59	28 75	N		39 32 55	−1 89	30 66	1 91				
	4209	+ 24 43	S		12 23 29 39	−1 82	27 57	S		12 23 31 84	−2 38	29 46	0 1 89	m s 0 1 798	+ 0 002	− 0 241	0 1 559
	4218	+ 10 20	S		24 31 52	−2 43	29 09	S		24 33 49	−2 64	30 85	1 76				
	4228	+ 10 54	S		26 61 81	−2 40	59 41	S		27 3 83	−2 63	1 20	1 79				
	4292	+ 12 34	S		41 14 39	−2 34	12 05	S		41 16 40	−2 60	13 80	1 75				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

KARACHI (E) *Lat* 24° 51′ *Long* $4^h\ 28^m\ 13^s$; AND QUETTA (W) *Lat* 30° 12′ *Long* $4^h\ 28^m\ 12^s$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $B_N - C_N = -0^s\ 241$, $B_S - C_S = -0\ 241$	$\Delta L - \rho$
1890					h m s	s	s			h m s	s	s	m s				
Apr 10	3952	+ 44 14	N	*I P E*	11 31 52 42	+ 3 02	55 44	N	*I P W*	11 31 55 16	+ 1 90	57 06	0 1 62	m s 0 1 618	+ 0 002	− 0 241	0 1 379
	3965	+ 34 50	N	d c − 1 1	34 39 51	+ 2 41	41 92	N	d c − 7 0	34 41 82	+ 1 6,	43 49	1 57				
	3973	+ 42 20	N	b + 2 9 a − 108 0	37 11 46	+ 2 87	14 33	N	b − 6 1 a − 50 3	37 14 16	+ 1 85	16 01	1 68				
	3981	+ 48 23	N	Q + 1 84 s	39 37 89	+ 3 35	41 24	N	Q + 1 92 s	39 40 83	+ 2 01	42 84	1 60				
	3932	+ 17 24	S		11 28 23 61	+ 1 56	25 17	S		11 28 25 44	+ 1 36	26 80	0 1 63	m s 0 1 710	+ 0 002	− 0 241	0 1 471
	3940	+ 6 43	S		30 19 89	+ 1 12	21 01	S		30 21 56	+ 1 18	22 ,4	1 73				
	3970	+ 12 54	S		35 47 57	+ 1 36	48 93	S		35 49 41	+ 1 29	50 70	1 77				
	4235	+ 41 57	N	Q − 1 84 s	12 27 58 58	− 0 84	57 74	N	Q − 1 92 s	12 27 61 29	− 2 00	59 29	0 1 55	m s 0 1 563	+ 0 002	− 0 241	0 1 324
	4258	+ 41 29	N		32 56 10	− 0 86	55 24	N		32 58 88	− 2 01	56 87	1 63				
	4282	+ 44 42	N		38 42 92	− 0 62	42 30	N		38 45 79	− 1 93	43 86	1 56				
	4287	+ 46 2	N		39 24 99	− 0 52	24 47	N		39 27 88	− 1 90	25 98	1 51				
	4209	+ 24 43	S		12 23 24 92	− 1 80	23 12	S		12 23 27 18	− 2 36	24 82	0 1 70	m s 0 1 665	+ 0 002	− 0 241	0 1 436
	4218	+ 10 20	S		24 27 04	− 2 43	24 61	S		24 28 87	− 2 60	26 27	1 66				
	4228	+ 10 54	S		26 57 31	− 2 40	54 91	S		26 59 1,	− 2 59	56 58	1 67				
	4292	+ 12 34	S		41 9 85	− 2 34	7 51	S		41 11 ,0	− 2 56	9 14	1 63				
Apr 11	3952	+ 44 14	N	*I P E*	11 31 47 80	+ 3 05	50 85	N	*I P E*	11 31 49 99	+ 2 57	52 56	0 1 71	m s 0 1 648	+ 0 002	− 0 241	0 1 409
	3965	+ 34 50	N	d c − 1 1	34 34 8,	+ 2 44	37 31	N	d c + 5 4	34 36 59	+ 2 30	38 89	1 58				
	3973	+ 42 20	N	b + 3 8 a − 107 4	37 6 80	+ 2 91	9 71	N	b + 4 9 a − 43 5	37 8 96	+ 2 51	11 47	1 76				
	3981	+ 48 23	N	Q + 1 85 s	39 33 27	+ 3 38	36 65	N	Q + 1 92 s	39 35 47	+ 2 72	38 19	1 54				
	3919	+ 14 59	S		11 25 24 24	+ 1 48	25 72	S		11 25 25 51	+ 1 89	27 40	0 1 68	m s 0 1 670	+ 0 002	− 0 241	0 1 431
	3932	+ 17 24	S		28 19 01	+ 1 59	20 60	S		28 20 30	+ 1 93	22 23	1 63				
	3940	+ 6 43	S		30 15 30	+ 1 16	16 46	S		30 16 41	+ 1 75	18 16	1 70				
	3970	+ 12 54	S		35 43 00	+ 1 39	44 39	S		35 44 21	+ 1 85	46 06	1 67				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

KARACHI (E) *Lat* 24° 51′ *Long* 4h 28m 13s AND QUETTA (W) *Lat* 30° 12′ *Long* 4h 28m 12s

Astronomical Date	Star: B.A.C. Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	(W − E): Mean of Group	Correction for Rate of E Clock	Corrns for Pers'l Equations $B_N - C_N = -0^s 241$, $B_S - C_S = -0\ 241$	$\Delta L - \rho$
1890		° ′			h m s	s	s			h m s	s	s	m s	m s	s	s	m s
Apr 11	4235	+ 41 57	N	*I P E*	12 2, 53 88	−0 82	53 06	N	*I P E*	12 27 56 09	−1 35	54 ,4	0 1 68				
	4258	+ 41 29	N	d c − 1 1 b + 3 8 a −107 4	32 51 50	−0 85	50 65	N	d c + 5 4 b + 4 9 a −43 5	32 53 67	−1 36	52 31	1 66	0 1 630	+ 0 002	− 0 241	0 1 395
	4282	+ 44 42	N		38 38 22	−0 62	37 60	N		38 40 52	−1 26	39 26	1 66				
	4287	+ 46 2	N	s Q − 1 85	39 20 38	−0 52	19 86	N	s Q − 1 92	39 22 60	−1 22	21 38	1 52				
	4209	+ 24 43	S		12 23 20 31	−1 79	18 52	S		12 23 21 94	−1 77	20 47	0 1 65				
	4228	+ 10 54	S		26 52 66	−2 39	50 2,	S		26 53 99	−2 02	51 97	1 70	0 1 683	+ 0 002	− 0 241	0 1 444
	4292	+ 12 34	S		41 5 24	−2 32	2 92	S		41 6 61	−1 99	4 62	1 70				
Apr 12	3952	+ 44 14	N	*I P W*	11 31 43 09	+2 98	46 07	N	*I P E*	11 31 45 75	+2 20	47 95	0 1 88				
	3965	+ 34 50	N	d c − 0 5 b − 0 4 a −109 1	34 30 17	+2 38	32 55	N	d c + 5 4 b + 0 2 a −12 3	34 32 31	+2 12	34 43	1 88	0 1 848	+ 0 002	− 0 241	0 1 609
	3978	+ 42 20	N		37 2 14	+2 84	4 98	N		3, 4 70	+2 18	6 88	1 90				
	3981	+ 48 23	N	s Q + 1 88	39 28 56	+3 32	31 88	N	s Q + 1 93	39 31 36	+2 25	33 61	1 73				
	3919	+ 14 59	S		11 25 19 54	+1 42	20 96	S		11 25 20 92	+1 98	22 90	0 1 94				
	3932	+ 17 24	S		28 14 28	+1 53	15 81	S		28 15 73	+2 00	17 73	1 92	0 1 948	+ 0 002	− 0 241	0 1 ,09
	3940	+ 6 43	S		30 10 65	+1 10	11 75	S		30 11 74	+1 94	13 68	1 93				
	3970	+ 12 54	S		35 38 20	+1 34	39 54	S		35 39 57	+1 97	41 54	2 00				
	4235	+ 41 57	N	s Q − 1 88	12 27 49 30	−0 95	48 35	N	s Q − 1 93	12 27 51 92	−1 68	50 24	0 1 89				
	4258	+ 41 29	N		32 46 78	−0 96	45 82	N		32 49 44	−1 69	47 75	1 93	0 1 955	+ 0 002	− 0 241	0 1 716
	4282	+ 44 42	N		38 33 55	−0 74	32 81	N		38 36 44	−1 65	34 79	1 98				
	4287	+ 46 2	N		39 15 50	−0 63	14 87	N		39 18 53	−1 64	16 89	2 02				
	4209	+ 24 43	S		12 23 15 53	−1 90	13 63	S		12 23 17 44	−1 83	15 61	0 1 98				
	4218	+ 10 20	S		24 17 65	−2 52	15 13	S		24 19 04	−1 91	17 13	2 00	0 1 988	+ 0 002	− 0 241	0 1 749
	4228	+ 10 54	S		26 47 98	−2 50	45 48	S		26 49 34	−1 90	47 44	1 96				
	4292	+ 12 34	S		40 60 45	−2 43	58 02	S		41 1 92	−1 89	0 03	2 01				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

KARACHI (E) *Lat* 24 51′ *Long* $4^h\ 28^m\ 18^s$; AND QUETTA (W) *Lat* 30° 12′, *Long* $4^h\ 28^m\ 12^s$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl Equations $B_N - C_N = -0.241$, $B_S - C_S = -0.241$	$\Delta L + \rho$
1890		′			h m s	s	s			h m s	s	s	m s				
Apr 7	3998	+ 35 33	N	*I P E*	11 45 20 17	+2 38	22 55	N	*I P E*	11 45 22 28	+2 21	24 49	0 1 94	m s 0 1 933	− 0 003	− 0 241	0 1 689
	4010	+ 38 34	N	d c − 1 1	47 59 61	+2 57	62 18	N	d c + 5 4	48 1 93	+2 22	4 15	1 97				
	4018	+ 41 32	N	b + 0 4, a −108 5	49 28 89	+2 76	31 65	N	b + 4 7, a −10 3	49 31 32	+2 26	33 58	1 93				
	4057	+ 43 39	N	s Q + 1 85	57 52 76	+2 92	55 68	N	s Q + 1 90	57 55 29	+2 28	57 57	1 89				
	4031	+ 16 16	S		11 51 23 22	+1 45	24 67	S		11 51 24 46	+2 08	26 54	0 1 87	m s 0 1 850	− 0 003	− 0 241	0 1 606
	4052	+ 7 14	S		56 36 62	+1 10	37 72	S		56 37 63	+2 03	39 66	1 94				
	4066	+ 22 4	S		12 0 0 68	+1 70	2 38	S		12 0 2 07	+2 10	4 17	1 79				
	4072	+ 9 21	S		0 58 81	+1 18	59 99	S		0 59 75	+2 04	61 79	1 80				
Apr 8	3998	+ 35 33	N	*I P W*	11 45 27 15	+2 31	29 46	N	*I P E*	11 45 29 22	+2 24	31 46	0 2 00	m s 0 1 953	− 0 003	− 0 241	0 1 709
	4010	+ 38 34	N	d c − 0 5	48 6 70	+2 50	9 20	N	d c + 5 4	48 8 86	+2 26	11 12	1 92				
	4057	+ 43 39	N	b − 1 3, a −108 5	57 59 78	+2 84	62 62	N	b + 4 7, a −12 2	58 2 23	+2 33	4 56	1 94				
				s Q + 1 81					s Q + 1 93								
	4031	+ 16 16	S		11 51 30 20	+1 39	31 59	S		11 51 31 44	+2 10	33 54	0 1 95	m s 0 1 970	− 0 003	− 0 241	0 1 726
	4052	+ 7 14	S		56 43 62	+1 03	44 65	S		56 44 53	+2 04	46 57	1 92				
	4066	+ 22 4	S		12 0 7 57	+1 64	9 21	S		12 0 9 11	+2 13	11 24	2 03				
	4072	+ 9 21	S		1 5 76	+1 11	6 87	S		1 6 80	+2 05	8 85	1 98				
	4126	+ 41 16	N	s Q − 1 81	12 12 8 76	−0 95	7 81	N	s Q − 1 93	12 12 11 37	−1 56	9 81	0 2 00	m s 0 2 020	− 0 003	− 0 241	0 1 776
	4177	+ 43 9	N		19 54 26	−0 83	53 43	N		19 57 02	−1 54	55 48	2 05				
	4188	+ 39 38	N		21 57 90	−1 06	56 84	N		21 60 43	−1 58	58 85	2 01				
	4110	+ 21 9	S		12 8 6 30	−2 01	4 29	S		12 8 8 04	−1 74	6 30	0 2 01	m s 0 1 985	− 0 003	− 0 241	0 1 741
	4114	+ 10 53	S		9 22 92	−2 45	20 47	S		9 24 23	−1 80	22 43	1 96				
	4156	+ 18 24	S		16 42 36	−2 13	40 23	S		16 43 93	−1 75	42 18	1 95				
	4168	+ 5 55	S		18 29 73	−2 64	27 09	S		18 30 93	−1 82	29 11	2 02				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

KARACHI (E) *Lat 24° 51 Long 4h 28m 13* AND QUETTA (W) *Lat 30° 12' Long 4h 28m 12s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl Equations $B_N - C_N = -0^s\ 241$, $B_S - C_S = -0\ 241$	$\Delta L + \rho$
1890		°			h m s	s	s			h m s	s	s	m s				
Apr 9	3998	+ 35 33	N	*I P W*	11 45 34 09	+ 2 32	36 41	N	*I P W*	11 45 36 74	+ 1 71	38 45	0 2 04	m s 0 2 038	− 0 003	− 0 241	0 1 794
	4010	+ 38 34	N	d c − 0 5	48 13 58	+ 2 50	16 08	N	d c − 7 0	48 16 36	+ 1 77	18 13	2 05				
	4018	+ 41 32	N	b − 0 3 a − 106 2	49 42 83	+ 2 69	45 52	N	b − 6 3 a − 53 3	49 45 68	+ 1 8,	47 53	2 01				
	4057	+ 43 39	N	s Q + 1 80	58 6 68	+ 2 83	9 51	N	s Q + 1 93	58 9 66	+ 1 90	11 56	2 05				
	4031	+ 16 16	S		11 51 37 23	+ 1 41	38 64	S		11 51 39 20	+ 1 34	40 54	0 1 90	m s 0 1 963	− 0 003	− 0 241	0 1 719
	4052	+ 7 14	S		56 50 57	+ 1 06	51 63	S		56 52 45	+ 1 1,	53 62	1 99				
	4066	+ 22 4	S		12 0 14 60	+ 1 65	16 25	S		12 0 16 81	+ 1 43	18 24	1 99				
	4072	+ 9 21	S		1 12 ,3	+ 1 13	13 86	S		1 14 62	+ 1 21	15 83	1 97				
	4126	+ 41 16	N	s Q − 1 80	12 12 15 ,1	− 0 93	14 78	N	s Q − 1 93	12 12 18 81	− 2 02	16 79	0 2 01	m s 0 2 043	− 0 003	− 0 241	0 1 799
	4148	+ 49 36	N		16 2 08	− 0 29	1 79	N		16 5 69	− 1 ,7	3 92	2 13				
	4177	+ 43 9	N		20 1 19	− 0 81	0 38	N		20 4 35	− 1 96	2 39	2 01				
	4188	+ 39 38	N		22 4 83	− 1 03	3 80	N		22 7 87	− 2 05	5 82	2 02				
	4110	+ 21 9	S		12 8 13 25	− 1 98	11 27	S		12 8 15 68	− 2 45	13 23	0 1 96	m s 0 1 928	− 0 003	− 0 241	0 1 684
	4114	+ 10 53	S		9 29 93	− 2 40	27 53	S		9 32 06	− 2 63	29 43	1 90				
	4156	+ 18 24	S		16 49 31	− 2 10	47 21	S		16 51 66	− 2 51	49 15	1 94				
	4168	+ 5 55	S		18 36 65	− 2 60	34 05	S		18 38 67	− 2 71	35 96	1 91				
Apr 10	3998	+ 35 33	N	*I P E*	11 45 41 21	+ 2 44	43 65	N	*I P W*	11 45 43 ,7	+ 1 69	45 46	0 1 81	m s 0 1 ,93	− 0 003	− 0 241	0 1 549
	4010	+ 38 34	N	d c − 1 1	48 20 71	+ 2 62	23 33	N	d c − 7 0	48 23 38	+ 1 76	25 14	1 81				
	4018	+ 41 32	N	b + 2 9 a − 108 0	49 49 90	+ 2 82	52 72	N	b − 6 1 a − 50 3	49 52 ,2	+ 1 83	54 55	1 83				
	4057	+ 43 39	N	s Q + 1 84	58 13 82	+ 2 97	16 79	N	s Q + 1 92	58 16 63	+ 1 88	18 51	1 72				
	4031	+ 16 16	S		11 51 44 23	+ 1 50	45 73	S		11 51 46 26	+ 1 34	47 60	0 1 87	m s 0 1 815	− 0 003	− 0 241	0 1 571
	4052	+ 7 14	S		56 57 62	+ 1 15	58 77	S		56 59 38	+ 1 19	60 57	1 80				
	4066	+ 22 4	S		12 0 21 6,	+ 1 75	23 42	S		12 0 23 78	+ 1 43	25 21	1 79				
	4072	+ 9 21	S		1 19 74	+ 1 22	20 96	S		1 21 54	+ 1 22	22 76	1 80				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

KARACHI (E) *Lat* 24° 51′ *Long* 4h 28m 18s; AND QUETTA (W) *Lat* 30° 12′ *Long* 4h 28m 12s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $B_N - C_N = -0\ 241$, $B_S - C_S = -0\ 241$	$\Delta L + \rho$
1890					h m s	s	s			h m s	s	s	m s				
Apr 10	4126	+ 41 16	N	I P E	12 12 22 95	−0 88	22 07	N	I P W	12 12 25 84	−2 02	23 82	0 1 75	m s 0 1 753	− 0 003	− 0 241	0 1 509
	4148	+ 49 36	N	d c − 1 1	16 9 37	−0 22	9 15	N	d c − 7 0	16 12 64	−1 78	10 86	1 71				
	4177	+ 43 9	N	b + 2 9 a −108 0	20 8 38	−0 75	7 63	N	b − 6 1 a −50 3	20 11 41	−1 96	9 45	1 82				
	4188	+ 39 38	N	s Q − 1 84	22 [illegible] 03	−0 99	11 04	N	s Q − 1 92	22 14 83	−2 06	12 77	1 73				
	4110	+ 21 9	S		12 8 20 45	−1 96	18 49	S		12 8 22 69	−2 42	20 27	0 1 78	m s 0 1 820	− 0 003	− 0 241	0 1 576
	4114	+ 10 53	S		9 37 00	−2 40	34 60	S		9 39 04	−2 59	36 45	1 85				
	4168	+ 5 55	S		18 43 81	−2 59	41 22	S		18 45 72	−2 67	43 0[illegible]	1 83				
Apr 11	3998	+ 35 33	N	I P E	11 45 48 15	+2 47	50 62	N	I P E	11 45 50 02	+2 31	52 33	0 1 71	m s 0 1 [illegible]60	− 0 003	− 0 241	0 1 516
	4010	+ 38 34	[illegible]	d c − 1 1	48 27 61	+2 66	30 27	N	d c + 5 4	48 29 69	+2 39	32 08	1 81				
	4018	+ 41 32	N	b + 3 8 a −107 4	49 56 82	+2 86	59 68	N	b + 4 9 a −43 5	49 58 98	+2 48	61 46	1 78				
	4057	+ 43 39	N	s Q + 1 85	58 20 72	+3 00	23 72	N	s Q + 1 92	58 22 91	+2 55	25 46	1 74				
	4031	+ 16 16	S		11 51 51 12	+1 53	52 65	S		11 [illegible] 52 60	+1 92	54 52	0 1 87	m s 0 1 85	− 0 003	− 0 241	0 1 611
	4052	+ 7 14	S		57 4 55	+1 18	5 73	S		57 5 81	+1 76	7 57	1 84				
	406[illegible]	+ 22 4	S		12 0 28 59	+1 78	30 37	S		12 0 30 16	+2 03	32 18	1 81				
	4072	+ 9 21	S		1 26 65	+1 25	2[illegible] 90	S		1 28 01	+1 79	29 80	1 90				
	4126	+ 41 16	N	s Q − 1 85	12 12 29 79	−0 8[illegible]	28 92	N	s Q − 1 92	12 12 32 16	−1 37	30 79	0 1 87	m s 0 1 870	− 0 003	− 0 241	0 1·626
	4148	+ 49 36	N		16 16 29	−0 21	16 08	N		16 18 97	−1 07	17 90	1 82				
	4188	+ 39 38	N		22 18 91	−0 98	17 93	N		22 21 26	−1 41	19 85	1 92				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

KARACHI (E) *Lat* 24° 51 *Long* 4h 28m 13s AND QUETTA (W) *Lat* 30° 12', *Long* 4h 28m 12s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	In strumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	In strumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl Equations $B_E - C_E = -0^s\ 241$, $B_E - C_E = -0\ 241$	$\Delta L + \rho$
1890					h m s	s	s			h m s	s	s	m s				
Apr 11	4110	+ 21 9	S	*I P E*	12 8 27 34	−1 95	25 9	S	*I P E*	12 8 29 10	−1 84	27 26	0 1 87	m s 0 1 843	− 0 003	− 0 241	0 1 599
	4114	+ 10 53	S	d c − 1 1	9 43 94	−2 39	41 55	S	d c + 5 4	9 45 41	−2 02	43 39	1 84				
	4156	+ 18 24	S	b + 3 8 a −107 4	17 3 41	−2 01	1 40	S	b + 4 9 a −43 5	17 5 09	−1 89	3 20	1 80				
	4168	+ 5 55	S	s Q − 1 85	18 50 77	−2 57	48 20	S	s Q − 1 92	18 52 16	−2 10	50 06	1 86				
Apr 12	3998	+ 35 33	N	*I P W*	11 45 54 60	+2 42	57 02	N	*I P E*	11 45 56 94	+2 12	59 06	0 2 04	m s 0 2 028	− 0 002	− 0 241	0 1 ,85
	4010	+ 38 34	N	d c − 0 5	48 34 07	+ 60	36 67	N	d c + 5 4	48 36 58	+2 14	38 72	2 05				
	4018	+ 41 32	N	b − 0 4 a −109 1	50 3 28	+2 80	6 08	N	b + 0 2 a −12°3	50 5 91	+2 17	8 08	2 00				
	4057	+ 43 39	N	s Q + 1 88	58 27 18	+2 94	30 12	N	s Q + 1 93	58 29 94	+2 20	32 14	2 02				
	4031	+ 16 16	S		11 51 57 53	+1 48	59 01	S		11 51 59 18	+1 99	61 17	0 2 16	m s 0 2 125	− 0 002	− 0 241	0 1 882
	4052	+ 7 14	S		57 11 03	+1 12	12 15	S		57 12 30	+1 94	14 24	2 09				
	4066	+ 22 4	S		12 0 35 03	+1 73	36 76	S		12 0 36 83	+2 02	38 85	2 09				
	4072	+ 9 21	S		1 33 16	+1 19	34 35	S		1 34 56	+1 95	36 51	2 16				
	4126	+ 41 16	N	s Q − 1 88	12 12 36 35	−0 98	35 37	N	s Q − 1 93	12 12 39 16	−1 69	37 47	0 2 10	m s 0 2 130	− 0 002	− 0 241	0 1 887
	4148	+ 49 36	N		16 22 77	−0 33	22 44	N		16 26 13	−1 59	24 54	2 10				
	4177	+ 43 9	N		20 21 77	−0 86	20 91	N		20 24 74	−1 67	23 07	2 16				
	4188	+ 39 38	N		22 25 41	−1 09	24 32	N		22 28 18	−1 70	26 48	2 16				
	4110	+ 21 9	S		12 8 33 81	−2 06	31 75	S		12 8 35 78	−1 85	33 93	0 2 18	m s 0 2 195	− 0 002	− 0 241	0 1 952
	4114	+ 10 53	S		9 50 33	−2 50	47 83	S		9 51 95	−1 90	50 05	2 22				
	4156	+ 18 24	S		17 9 89	−2 18	7 71	S		17 11 70	−1 86	9 84	2 13				
	4168	+ 5 55	S		18 57 16	−2 70	54 46	S		18 58 63	−1 92	56 71	2 25				

Arc	Approximate Difference of Longitude	Intervals between Nights of Observations	Rate Corrections for both Clocks Deduced from Transits Observed at both Stations, viz: α, Corrections for the Intervals between Nights of Observations and β, Hourly Corrections for Nights of Observations, Interpolated by means of the Quantities α.								
			α at E Station for		α at W Station for		Astronomical Dates of Observations	β for		Correction to Observed Difference of Times of Transit for	
			E Clock	W Clock	E Clock	W Clock		E Clock	W Clock	E Clock	W Clock
Agra (E) and Moolian (W)	26ᵐ 19	1889	s	s	s	s	1889	s	s	s	s
		November 15 to 16	+ 9 567	− 7 539	+ 9 486	− 7 782	November 15	+ 0 397	− 0 319	+ 0 173	− 0 139
		„ 16 17	+ 9 512	− 7 463	+ 9 462	− 7 413	„ 16	+ 396	− 315	+ 173	− 137
		„ 17 18	+ 9 303	− 7 613	+ 9 435	− 7 486	17	+ 393	− 312	+ 171	− 136
		„ 18 19	+ 9 406	− 7 613	+ 9 494	− 7 486	, 18	+ 392	− 315	+ 171	− 137
		, 19 20	+ 9 432	− 7 3[illegible]5	+ 9 458	− 7 338	19	+ 394	− 311	+ 172	− 136
		, 20 21	+ 9 413	− 7 160	+ 9 303	− 7 516	20	+ 392	− 306	+ 171	− 133
		, 21 22	+ 9 413	− 7 534	+ 9 303	− 7 383	21	+ 390	− 308	+ 170	− 134
							22	+ 390	− 311	+ 170	− 136
Agra (E) and Karachi (W)	44ᵐ 1	December 1 to 2	+ 7 036	+ 0 968	+ 6 773	+ 0 815	December 1	+ 0 288	+ 0 037	+ 0 211	+ 0 027
		2 3	+ 6 786	+ 1 035	+ 6 861	+ 1 129	, 2	+ 286	+ 041	+ 210	+ 030
		, 3 4	+ 6 582	+ 0 588	+ 6 801	+ 0 772	, 3	+ 282	+ 037	+ 207	+ 027
		„ 4 5	+ 6 718	+ 1 105	+ 6 734	+ 1 118	, 4	+ 280	+ 037	+ 206	+ 027
		, 5 6	+ 7 118	+ 1 569	+ 6 761	+ 1 322	5	+ 28[illegible]	+ 053	+ 209	+ 039
							„ 6	+ 289	+ 060	+ 212	+ 044
Agra (E) and Kalianpur (W)	1ᵐ 27	1889 90					1889 90				
		December 28 to 29	+ 0 488	+ 1 018	+ 0 249	+ 0 807	December 28	+ 0 015	+ 0 0[illegible]8	0 000	+ 0 001
		29 30	+ 0 340	+ 1 118	+ 0 333	+ 1 084	29	+ 015	+ 042	000	+ 001
		„ 30 31	+ 0 316	+ 1 106	+ 0 315	+ 1 109	30	+ 014	+ 046	000	+ 001
		31 Jan 1	+ 0 079	+ 0 899	+ 0 355	+ 1 176	31	+ 011	+ 045	000	+ 001
		January 1 2	+ 0 355	+ 1 686	+ 0 420	+ 1 794	January 1	+ 013	+ 057	000	+ 001
							2	+ 016	+ 070	000	+ 002
Kalianpur (E) and Bombay (W)	19ᵐ 21	1890					1890				
		January 15 to 16	+ 0 754	− 1 547	+ 0 712	− 1 611	January 15	+ 0 031	− 0 066	+ 0 010	− 0 021
		16 17	+ 0 7[illegible]4	− 1 547	+ 0 712	− 1 611	16	+ 031	− 066	+ 010	− 021
		, 17 18	+ 0 528	− 1 804	+ 0 478	− 1 792	17	+ 026	− 0[illegible]0	+ 008	− 023
		„ 18 19	+ 0 626	− 1 845	+ 0 654	− 1 8[illegible]6	, 18	+ 024	− 076	+ 008	− 025
		, 19 20	+ 0 579	− 1 929	+ 0 608	− 1 923	19	+ 026	− 079	+ 008	− 026
		, 20 21	+ 0 581	− 2 156	+ 0 534	− 2 144	20	+ 024	− 085	+ 008	− 027
							, 21	+ 023	− 090	+ 007	− 029

Arc	Approximate Difference of Longitude	Intervals between Nights of Observations	Rate Corrections for both Clocks Deduced from Transits Observed at both Stations, viz.: ε, Corrections for the Intervals between Nights of Observations, and β, Hourly Corrections for Nights of Observations, Interpolated by means of the Quantities ε.								
			ε at E Station for		ε at W Station for		Astronomical Dates of Observations	β for		Correction to Observed Difference of Times of Transit for	
			E Clock	W Clock	E Clock	W Clock		E Clock	W Clock	E Clock	W Clock
Jubbulpore (E), and Kalianpur (W)	9^m 11	1890	s	s	s	s	1890	s	s	s	s
		February 4 to 5	+ 1·056	+ 1·864	+ 1·043	+ 1·840	February 4	+ 0·044	+ 0·077	+ 0·007	+ 0·012
		„ 5 „ 6	+ 1·207	+ 1·760	+ 1·196	+ 1·700	„ 5	+ ·047	+ ·075	+ ·007	+ ·011
		„ 6 „ 7	+ 1·324	+ 1·028	+ 1·367	+ 1·159	„ 6	+ ·053	+ ·059	+ ·008	+ ·009
		„ 7 „ 8	+ 1·058	+ 0·975	+ 1·023	+ 0·951	„ 7	+ ·050	+ ·043	+ ·008	+ ·007
		„ 8 „ 9	+ 1·166	+ 1·111	+ 1·073	+ 0·984	„ 8	+ ·045	+ ·042	+ ·007	+ ·006
							„ 9	+ ·047	+ ·044	+ ·007	+ ·007
Mooltan (E) and Quetta (W)	17^m 44	March 24 to 25	− 8·327	− 7·190	− 8·342	− 7·181	March 24	− 0·347	− 0·300	− 0·105	− 0·091
		„ *25 „ 26	− 8·327	− 7·190	− 8·342	− 7·181	„ 25	− ·347	− ·300	− ·105	− ·091
		„ *26 „ 27	− 8·327	− 7·190	− 8·342	− 7·181	„ 26	− ·347	− ·300	− ·105	− ·091
		„ 27 „ 28	− 8·037	− 6·731	− 8·180	− 6·732	„ 27	− ·343	− ·290	− ·104	− ·088
		„ 28 „ 29	− 8·186	− 6·971	− 8·155	− 6·949	„ 28	− ·339	− ·285	− ·103	− ·087
		„ *29 „ 30	− 8·186	− 6·971	− 8·155	− 6·949	„ 29	− ·341	− ·290	− ·104	− ·088
		„ 30 „ 31	− 8·034	− 7·081	− 8·036	− 7·110	„ 30	− ·338	− ·293	− ·103	− ·089
							„ 31	− ·335	− ·296	− ·102	− ·090
Karachi (E) and Quetta (W)	0^m 1	April 7 to 8	+ 5·164	− 6·919	+ 5·017	− 6·996	April 7	+ 0·212	− 0·290	+ 0·002	− 0·003
		„ 8 „ 9	+ 4·933	− 6·974	+ 4·923	− 6·974	„ 8	+ ·209	− ·290	+ ·002	− ·003
		„ 9 „ 10	+ 4·464	− 7·205	+ 4·682	− 7·002	„ 9	+ ·198	− ·293	+ ·002	− ·003
		„ 10 „ 11	+ 4·606	− 6·934	+ 4·584	− 6·974	„ 10	+ ·191	− ·293	+ ·002	− ·003
		„ 11 „ 12	+ 4·803	− 6·375	+ 4·529	− 6·663	„ 11	+ ·193	− ·282	+ ·002	− ·003
							„ 12	+ ·194	− ·272	+ ·002	− ·002

* There were no observations on these dates but the rates were obtained by interpolation for the number of days missing

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL

AND THE RETARDATION OF SIGNALS, ρ

AGRA (E), AND MOOLTAN (W)

Astronomical Date	Instrumental Position at		Apparent Difference of Longitude by Observations with					
			E Clock $= \Delta L - \rho$			W Clock $= \Delta L + \rho$		
	E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1889			m s	m s	m s	m s	m s	m s
November 15	*I P E*	*I P W*	26 19 027	26 18 982	26 18 977	26 19 125	26 19 083	26 19 067
" "	"	"	18 935	18 965		19 030	19 030	
" 16	*I P W*	"	19 102	18 995	19 074	19 315	19 327	19 355
" "	"	"	19 102	19 095		19 432	19 347	
" 17	"	*I P E*	19 115	19 083	19 117	19 253	19 318	19 290
" "	"	"	19 093	19 178		19 270	19 318	
" 18	*I P E*	"	19 028	18 960	18 974			
" "	"	"	18 903	19 003				
" 19	"	"	18 914	18 926	18 895	19 021	19 076	19 032
" "	"	"	18 816	18 926		19 036	18 996	
" 20	"	*I P W*	18 898	18 883	18 869	19 054	19 061	19 010
" "	"	"	18 863	18 833		18 919	19 006	
" 21	*I P W*	"				19 492	19 365	19 387
" "	"	"				19 273	19 418	
" 22	"	*I P E*	19 172	19 174	19 088	19 216	19 191	19 221
" "	"	"	19 004	19 002		19 208	19 268	
Means	*I P E*	*I P W*	26 18 931	26 18 916	26 18 923	26 19 032	26 19 045	26 19 039
	I P W	"	19 102	19 045	19 074	19 378	19 364	19 371
	"	*I P E*	19 096	19 109	19 103	19 237	19 274	19 256
	I P E	"	18 915	18 954	18 935	19 029	19 036	19 033
General Means			26 19 011	26 19 006	26 19 009	26 19 169	26 19 180	26 19 175

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 26^m + \frac{1}{2}(19^s\,009 + 19^s\,175) = 26^m\,19^s\,092,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(19^s\,175 - 19^s\,009) = +\,0^s\,083$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL AND THE RETARDATION OF SIGNALS, ρ.

AGRA (E), AND KARACHI (W)

Astronomical Date	Instrumental Position at E	Instrumental Position at W	Apparent Difference of Longitude by Observations with E Clock = ΔL − ρ: By N Stars	E Clock: By S Stars	E Clock: Means	W Clock = ΔL + ρ: By N Stars	W Clock: By S Stars	W Clock: Means
1889			m s	m s	m s	m s	m s	m s
December 1	*I P E*	*I P W*	44 0 750	44 0 770	44 0 760	44 1 056	44 1 091	44 1 111
" 1	"	"	0 743	0 775		1 101	1 196	
" 2	*I P W*	"	0 979	0 989	1 012	1 269	1 259	1 267
" "	"	"	1 044	1 034		1 197	1 342	
" 3	"	*I P E*	0 854	0 911	0 934	1 161	1 119	1 170
" "	"	"	0 951	1 019		1 204	1 194	
" 4	*I P E*	"	0 688	0 728	0 714	1 013	1 046	0 985
" "	"	"	0 700	0 740		0 934	0 946	
" 5	"	"	0 646	0 713	0 701	0 896	0 961	0 969
" "	"	"	0 718	0 726		0 941	1 078	
" 6	*I P W*	*I P W*	1 044	1 081	1 061	1 236	1 223	1 216
" "	"	"	1 006	1 114		1 170	1 233	
Means	*I P E*	*I P W*	44 0 747	44 0 773	44 0 760	44 1 078	44 1 144	44 1 111
	I P W	"	1 018	1 055	1 036	1 218	1 264	1 241
	"	*I P E*	0 903	0 965	0 934	1 183	1 157	1 170
	I P E	"	0 688	0 727	0 707	0 946	1 008	0 977
General Means			44 0 839	44 0 880	44 0 859	44 1 106	44 1 143	44 1 125

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 44^m + \frac{1}{2}(0^s\ 859 + 1^s\ 125) = 44^m\ 0^s\ 992,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(1^s\ 125 - 0^s\ 859) = +\ 0^s\ 133$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL

AND THE RETARDATION OF SIGNALS, ρ

AGRA (E), AND KALIANPUR (W)

Astronomical Date	Instrumental Position at		Apparent Difference of Longitude by Observations with					
			E Clock = $\Delta L - \rho$			W Clock = $\Delta L + \rho$		
	E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1889 90			m s	m s	m s	m s	m s	m s
December 28	I P E	I P W	1 27 164	1 27 164	1 27 152	1 27 198	1 27 228	1 27 272
" "	"	"	27 107	27 172		27 338	27 323	
" 29	I P W	"	27 334	27 427	27 402	27 463	27 478	27 483
" "	"	"	27 449	27 397		27 503	27 488	
" 30	"	I P E	27 417	27 412	27 402	27 480	27 518	27 509
" "	"	"	27 417	27 362		27 530	27 507	
" 31	"	"	27 407	27 409	27 408	27 495	27 508	27 517
" "	"	"	27 377	27 439		27 545	27 518	
January 1	I P E	"	27 134	27 132	27 132	27 225	27 275	27 240
" "	"	"	27 134	27 129		27 205	27 253	
" 2	"	I P W	27 039	27 149	27 094	27 231	27 231	27 233
" "	"	"				27 244	27 224	
Means "	I P E	I P W	1 27 087	1 27 158	1 27 123	1 27 253	1 27 252	1 27 253
	I P W	"	27 392	27 412	27 402	27 482	27 483	27 483
	"	I P E	27 405	27 405	27 405	27 512	27 513	27 513
	I P E	"	27 134	27 130	27 132	27 215	27 264	27 240
General Means			1 27 255	1 27 276	1 27 266	1 27 366	1 27 378	1 27 372

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 1^m + \frac{1}{2}(27^s\,266 + 27^s\,372) = 1^m\,27^s\,319,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(27^s\,372 - 27^s\,266) = +\,0^s\,053$

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL

AND THE RETARDATION OF SIGNALS, ρ.

KALIANPUR (E) AND BOMBAY (W)

Astronomical Date		Instrumental Position at E	Instrumental Position at W	Apparent Difference of Longitude by Observations with E Clock = ΔL − ρ: By N Stars	E Clock: By S Stars	E Clock: Means	W Clock = ΔL + ρ: By N Stars	W Clock: By S Stars	W Clock: Means
1890				m s	m s	m s	m s	m s	m s
January	15	*I P W*	*I P E*	19 21 289	19 21 291	19 21 278	19 21 535	19 21 468	19 21 452
"	,	"	"	21 304	21 226		21 428	21 378	
"	17	"	*I P W*	21 429	21 324	21 355	21 613	21 553	21 563
"		"	"	21 352	21 314		21 541	21 546	
"	18	*I P E*	"	21 437	21 414	21 403	21 571	21 549	21 549
"	"	"	,	21 399	21 362		21 521	21 554	
	19	"	*I P E*	21 429	21 402	21 378	21 630	21 585	21 559
"	,	"	"	21 362	21 319		21 535	21 485	
"	20	"	"	21 344	21 307	21 347	21 567	21 537	21 557
"	,		"	21 367	21 369		21 579	21 544	
"	21	*I P W*	*I P W*	21 423	21 341	21 395	21 592	21 600	21 541
,		"	,	21 421	21 396		21 500	21 470	
Means		*I P W*	*I P E*	19 21 297	19 21 259	19 21 278	19 21 482	19 21 423	19 21 452
		"	*I P W*	21 406	21 344	21 375	21 562	21 542	21 552
		I P E	,	21 418	21 388	21 403	21 546	21 552	21 549
		"	*I P E*	21 376	21 349	21 362	21 578	21 537	21 557
General Means				19 21 374	19 21 335	19 21 355	19 21 542	19 21 514	19 21 528

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 19^m + \frac{1}{2}(21^s\,305 + 21^s\,528) = 19^m\,21^s\,441,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(21^s\,528 - 21^s\,355) = +\,0^s\,086$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL

AND THE RETARDATION OF SIGNALS, ρ

JUBBULPORE (E), AND KALIANPUR (W)

Astronomical Date	Instrumental Position at		Apparent Difference of Longitude by Observations with					
			E Clock $= \Delta L - \rho$			W Clock $= \Delta L + \rho$		
	E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1890			m s	m s	m s	m s	m s	m s
February 4	*I P E*	*I P W*	9 10 254	9 10 376	9 10 288	9 10 241	9 10 348	9 10 346
" "	"	,	10 266	10 254		10 374	10 419	
, 5	*I P W*	"	10 211	10 186	10 261	10 373	10 417	10 363
" "	"	"	10 341	10 306		10 350	10 320	
, 6	"	*I P E*	10 212	10 177	10 263	10 358	10 416	10 434
,	"	"	10 342	10 320		10 443	10 518	
, 7	*I P E*		10 190	10 205	10 231	10 344	10 276	10 289
" ,	"	"	10 215	10 314		10 254	10 283	
8	,	"	10 2,4	10 274	10 258	10 330	10 365	10 316
,	"		10 236	10 246		10 253	10 318	
, 9	*I P W*	*I P W*	10 346	10 339	10 351	10 446	10 449	10 437
, ,	"	"	10 331	10 389		10 414	10 439	
Means	*I P E*	*I P W*	9 10 260	9 10 315	9 10 288	9 10 308	9 10 384	9 10 346
	I P W	,	10 307	10 305	10 306	10 396	10 406	10 401
	,	*I P E*	10 277	10 249	10 263	10 401	10 467	10 434
	I P E	"	10 229	10 260	10 245	10 295	10 311	10 303
General Means			9 10 268	9 10 282	9 10 2,5	9 10 350	9 10 392	9 10 371

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 9^m + \frac{1}{2}(10^s\,275 + 10^s\,371) = 9^m\,10^s\,323,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(10^s\,371 - 10^s\,275) = +\,0^s\,048$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL

AND THE RETARDATION OF SIGNALS, ρ

MOOLTAN (E) AND QUETTA (W)

Astronomical Date		Instrumental Position at		Apparent Difference of Longitude by Observations with					
				E Clock = $\Delta L - \rho$			W Clock = $\Delta L + \rho$		
		E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1890				m s	m s	m s	m s	m s	m s
March	24	*I P E*	*I P E*	17 43 407	17 43 394	17 43 409	17 43 606	17 43 646	17 43 574
"	"	,	,	43 434	43 402		43 511	43 531	
	27	*I P W*	,	43 505	43 498	43 453	43 604	43 579	43 550
,	"	,	,		43 305		43 534	43 481	
,	28	,	*I P W*		43 606	43 527	43 555	43 580	43 551
,	,	"		43 529	43 444		43 555	43 515	
,	30	*I P E*	,	43 389	43 361	43 411	43 520	43 525	43 509
"	,	,		43 489	43 406		43 505	43 484	
	31	,		43 400	43 402	43 414	43 566	43 582	43 530
				43 467	43 385		43 517	43 453	
Means		*I P E*	*I P E*	17 43 421	17 43 398	17 43 409	17 43 559	17 43 588	17 43 574
		I P W		43 505	43 402	43 453	43 569	43 530	43 550
			I P W	43 529	43 525	43 527	43 555	43 548	43 551
		I P E	,	43 436	43 389	43 412	43 527	43 511	43 519
General Means				17 43 473	17 43 428	17 43 450	17 43 553	17 43 544	17 43 548

Whence $\Delta L = \frac{1}{2}\left\{(\Delta L - \rho) + (\Delta L + \rho)\right\} = 17^m + \frac{1}{2}(43^s\,450 + 43^s\,548) = 17^m\,43^s\,499,$

$$\rho = \frac{1}{2}\left\{(\Delta L + \rho) - (\Delta L - \rho)\right\} = \frac{1}{2}(43^s\,548 - 43^s\,450) = +\,0^s\,049$$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL

AND THE RETARDATION OF SIGNALS, ρ

KARACHI (E), AND QUETTA (W)

Astronomical Date		Instrumental Position at		Apparent Difference of Longitude by Observations with					
				E Clock = $\Delta L - \rho$			W Clock = $\Delta L + \rho$		
		E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1890				m s	m s	m s	m s	m s	m s
April	7	*I P E*	*I P E*	0 1 471	0 1 491	0 1 452	0 1 689	0 1 606	0 1 648
"	"	"	"	1 461	1 386				
"	8	*I P W*	"	1 551	1 621	1 614	1 709	1 726	1 738
"	"	"	"	1 701	1 581		1 776	1 741	
"	9	"	*I P W*	1 639	1 576	1 608	1 794	1 719	1 749
"	"	"	"	1 659	1 559		1 799	1 684	
"	10	*I P E*	"	1 379	1 471	1 400	1 549	1 571	1 551
"	"	"	"	1 324	1 426		1 509	1 576	
"	11	"	*I P E*	1 409	1 431	1 419	1 516	1 611	1 588
"	"	"	"	1 391	1 444		1 626	1 599	
"	12	*I P W*	"	1 609	1 709	1 696	1 785	1 882	1 877
"	"	"	"	1 716	1 749		1 887	1 952	
Means		*I P E*	*I P E*	0 1 433	0 1 438	0 1 436	0 1 630	0 1 606	0 1 618
		I P W	"	1 644	1 665	1 655	1 789	1 825	1 807
		"	*I P W*	1 649	1 568	1 608	1 797	1 701	1 749
		I P E	"	1 352	1 448	1 400	1 529	1 573	1 551
General Means				0 1 520	0 1 530	0 1 525	0 1 686	0 1 676	0 1 681

Whence $\Delta L = \frac{1}{2}\left\{(\Delta L - \rho) + (\Delta L + \rho)\right\} = 0^m + \frac{1}{2}(1^s\,525 + 1^s\,681) = 0^m\,1^s\,603,$

$$\rho = \frac{1}{2}\left\{(\Delta L + \rho) - (\Delta L - \rho)\right\} = \frac{1}{2}(1^s\,681 - 1^s\,525) = +\,0^s\,078$$

ELECTRO-TELEGRAPHIC LONGITUDES

1891-92.

INDIAN ARCS.

ABSTRACT OF THE OBSERVATIONS

AND

REDUCTION OF THE RESULTS.

NOTE

The Explanation of *Table I*, given on page 2 applies equally to the observations of 1891 92, in which the same Telescopes were used with the same Micrometers and the same wire systems

Astronl. Date	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks
1891	CALCUTTA (Telescope No 2)		d	d	d	d	d	d		WALTAIR (Telescope No 1)		d	d	d	d	d	d	
Dec 6		*I P E*	2071 0	2070 0	+3 3	+2 5	2068 1	+5 6			*I P E*	1485 8	1485 0	−4 2	−5 1	1496 4	−15 6	
							67 5					83 1				96 4		
							67 4											
„ 7		*I P W*	2075 5	2070 0	−3 3	−4 1	2073 6	0 0			*I P E*	1480 2	1485 0	−4 2	−5 1	1488 0	−8 9	
			74 2				72 9					83 9				91 0		
							73 3									90 1		
„ 8		*I P W*	2073 9	2070 0	−3 3	−4 1	2072 7	−1 0	Mean C_0		*I P W*	1478 1	1485 0	+4 2	+3 3	1483 6	+2 9	Mean C_0
							72 2		*I P E* = 2072 0			78 5				83 7		*I P E* = 1483 5
							71 9		*I P W* = 2074 6									*I P W* = 1478 1
„ 10		*I P E*	2072 0	2070 0	+3 3	+2 5	2071 8	+1 1	General Mean = 2073 3		*I P W*	1478 0	1480 0	−0 8	−1 7	1481 8	+0 5	General Mean = 1480 8
			73 8				72 9					77 6				81 0		
							72 0									81 0		
„ 11		*I P W*	2073 8	2070 0	−3 3	−4 1	2069 0	−2 1			*I P E*	1484 0	1485 0	−4 2	−5 1	1485 2	−4 8	
			74 4				73 7					83 5				86 0		
							71 0											
„ 12		*I P W*	2074 1	2070 0	−3 3	−4 1	2068 2	−4 1			*I P W*	1478 1	1480 0	−0 8	−1 7	1473 4	−8 2	
			76 8				69 4					78 4				72 3		
							70 1									72 0		
Dec 18	WALTAIR (Telescope No 1)	*I P W*	1476 6	1475 0	−5 6	−6 5	1477 8	−3 0		JUBBULPORE (Telescope No 2)	*I P E*	2076 0	2070 0	+8 0	+7 2	2070 7	+6 2	
			73 6				78 1									72 9		
							77 0											
„ 19		*I P E*	1484 4	1485 0	−4 4	−5 3	1481 6	−1 3			*I P E*	2077 9	2070 0	+8 0	+7 2	2069 3	+7 7	
			84 1				82 3									70 5		
							81 9									71 1		
„ 20		*I P E*	1484 8	1485 0	−4 4	−5 3	1482 2	−1 9	Mean C_0		*I P W*	2078 7	2070 0	−8 0	−8 8	2071 7	−7 3	Mean C_0
			84 5				82 3		*I P E* = 1484 5			78 9				70 1		*I P E* = 2077 3
							83 0		*I P W* = 1476 6							70 2		*I P W* = 2078 7
„ 21		*I P W*	1476 9	1480 0	−0 6	−1 5	1475 0	−5 6	General Mean = 1480 6		*I P W*	2076 7	2070 0	−8 0	−8 8	2068 8	−8 4	General Mean = 2078 0
			77 8				75 0					77 2				69 2		
																70 9		
„ 23		*I P W*	1477 1	1480 0	−0 6	−1 5	1474 3	−6 9			*I P W*	2080 5	2070 0	−8 0	−8 8	2069 7	−8 6	
			78 4				74 0					80 0				69 8		
							72 7									68 7		
„ 24		*I P W*	1474 9	1480 0	−0 6	−1 5	1473 7	−7 1			*I P E*	2077 9	2070 0	+8 0	+7 2	2078 2	−0 6	
			77 1				73 3									78 3		
																79 3		

Astronl Date	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks
1892	WALTAIR (Telescope No 1)		d	d	d	d	d	d		MADRAS (Telescope No 2)		d	d	d	d	d	d	
Jan 6		*I P W*	1475 0	1475 0	−4 5	−5 4	1475 2	−4 1			*I P E*	2076 5	2070 0	+8 4	+7 5	2076 0	+1 4	
			77 6				75 5					78 5				77 6		
																,7 5		
„ 7		*I P E*	1481 7	1475 0	+4 5	+3 6	1471 2	+7 6	Mean C_0		*I P E*	2076 9	2075 0	+3 4	+2 5	2078 9	−0 1	Mean C_0
			81 9				72 3		*I P E* = 1481 6			76 0				78 6		*I P E* = 2077 0
							72 3		*I P W* = 1477 3							78 0		*I P W* = 2079 7
									General Mean = 1479 5									General Mean = 2078 4
„ 10		*I P E*	1481 0	1480 0	−0 5	−1 4	1472 6	+6 0			*I P W*	2078 1	2075 0	−3 4	−4 3	2072 2	−6 5	
			81 7				74 1					80 5				72 3		
							73 7									71 3		
11		*I P W*	1478 0	1480 0	+0 5	−0 4	1484 6	+4 8			*I P W*	2078 2	2075 0	−3 4	−4 3	2073 6	−5 7	
			78 3				83 9					81 7				72 3		
																72 1		
Jan 18	WALTAIR (Telescope No 1)	*I P W*	1478 3	1480 0	+2 0	+1 1	14,6 4	−2 1		BOLARUM (Telescope No 2)	*I P E*	2070 2	2070 0	+1 9	+1 0	2074 7	−3 3	
			79 1				75 4					70 3				,6 0		
																75 0		
„ 19		*I P E*	1478 9	1480 0	−2 0	−2 9	1480 0	−3 2			*I P E*	2071 0	2070 0	+1 9	+1 0	2073 8	−3 2	
			78 1				82 4					72 0				74 9		
																76 5		
20		*I P E*	1478 9	1480 0	−2 0	−2 9	1481 1	−3 4			*I P W*	2071 8	20,0 0	−1 9	−2 8	2067 3	−4 2	
			78 4				81 6		Mean C_0							67 8		Mean C_0
									I P E = 1479 1							6 9		*I P E* = 2071 2
									I P W = 1476 9									*I P W* = 20,2 5
„ 21		*I P W*	1476 4	1480 0	+2 0	+1 1	1475 9	−2 4	General Mean = 1478 0		*I P W*	2072 9	2070 0	−1 9	−2 8	2068 1	−4 7	General Mean = 2071 9
			74 8				75 3					73 2				66 8		
																66 6		
„ 22		*I P W*	1477 2	1480 0	+2 0	+1 1	1474 7	−3 7			*I P E*	2071 4	2070 0	+1 9	+1 0	2072 0	−0 8	
			75 6				73 9					71 3				72 8		
																73 4		
„ 23		*I P E*	1481 2	1480 0	−2 0	−2 9	1482 6	−4 9			*I P E*	2071 0	2070 0	+1 9	+1 0	2071 6	0 0	
			78 7				83 2					72 1				71 9		
																72 1		

Astronl Date	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks
1892			d	d	d	d	d	d				d	d	d	d	d	d	
Feb 9	BOLARUM (Telescope No 2)	*I P E*	2071 3	2070 0	+1 8	+0 9	2065 7	+6 1		BOMBAY (Telescope No 1)	*I P E*	1505 [illegible]	1505 0	−0 2	−1 1	1508 8	−4 4	
			71 0				65 6					7 7				8 9		
							65 9									9 9		
10		*I P W*	2072 3	2070 0	−1 8	−2 7	2070 4	−2 1			*I P E*	1507 6	1505 0	−0 2	−1 1	1506 1	−1 1	
			72 1				69 1					8 2				6 0		
							69 5									5 7		
11		*I P W*	2072 2	2070 0	−1 8	−2 [illegible]	2070 1	−1 9	Mean C_0		*I P W*	1503 2	1505 0	+0 2	−0 [illegible]	1501 7	−2 6	Mean C_0
			72 2				69 6		*I P E* = 2071 1			1 3				2 5		*I P E* = 1507 6
							69 9		*I P W* = 2072 4							2 4		*I P W* = 1502 0
,, 12		*I P E*	2071 4	2070 0	+1 8	+0 9	2071 5	0 0	General Mean = 2071 8		*I P W*	1501 1	1505 0	+0 2	−0 7	1502 5	−2 3	General Mean = 1504 8
			70 2				72 4					2 3				2 6		
							71 5									2 3		
,, 13		*I P E*	2072 1	2070 0	+1 8	+0 9	2071 4	−0 3			*I P E*	1507 9	1505 0	−0 2	−1 1	1509 1	−4 2	
			70 6				72 0					8 7				9 1		
							73 0									8 [illegible]		
14		*I P W*	2072 9	2072 2 *	+0 4	−0 5	2072	+0 9			*I P E*	1507 5	1505 0	−0 2	−1 1	1508 8	−3 8	
			72 7	2070 0	−1 8	−2 7	73 1					7 2				9 2		
																7 7		
Mar 15	FYZABAD (Telescope No 2)	*I P E*	2073 6	2070 0	+4 7	+3 9	2071 2	+3 6		DEHRA DŪN (Telescope No 1)	*I P W*	1519 0	1518 0	+1 7	+0 9	1516 6	+0 2	
			7[illegible] 9				71 3					19 3				16 6		
			75 7				70 7									16 4		
16		*I P W*	2074 5	2070 0	−4 7	−5 5	2076 1	+1 8			*I P W*	1520 1	1520 0	+3 7	+2 9	1517 4	−0 1	
			75 0				76 [illegible]					19 5				16 1		
							76 8									15		
,, 17		*I P W*	2073 4	2070 0	−4 7	−5 5	2075 4	+1 2	Mean C_0		*I P E*	1513 4	1515 0 †	+1 3	+0 [illegible]	1515 5	+0 2	Mean C_0
			74 1				75 7		*I P E* = 2074 9			12 1	1528 5	−12 2	−13 0	16 5		*I P E* = 1514 1
							76 [illegible]		*I P W* = 2074 4							16 4		*I P W* = 1518 4
,, 18		*I P E*	2074 9	2070 0	+4 7	+3 9	2071 1	+2 6	General Mean = 2074 7		*I P E*	1515 1	1515 0	+1 3	+0 5	1516 1	−0 8	General Mean = 1516 3
			75 3				72 4					13 9				18 0		
							71 7											
19		*I P E*	2074 6	2070 0	+4 7	+3 9	2072 1	+2 9			*I P E*	1515 5	1515 0	+1 3	+0 5	1516 0	−0 9	
			74 2				72 1					14 6				17 [illegible]		
							71 2									17 9		
,, 20		*I P W*	2074 6	2070 0	−4 7	−5 5	2077 3	+3 1			*I P W*	1515 7	1515 0	−1 3	−2 1	1515 7	−1 5	
			74 6				77 5					16 [illegible]				14 6		
							78 5									14 1		

* C_s = 2072 2 for 1st 2 groups and 2070 0 for 2nd 2 groups

† C_s = 1515 0 for 1st 3 groups, and 1528 5 for last group.

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction *a*	Adopted Value of Deviation Correction
		1891							h m s	s	s	s	s	m s	h m s	m s	d	d
CALCUTTA (E) AND WALTAIR (W)	CALCUTTA (Latitude 22 33')			E	Radcliffe 1811	U	5	−0 274	4 53 45 3	+0 8	+0 8	−1 9		45 0	4 53 42 1	− 0 2 9	− 0 2	
		Dec 6	*I P E*	,,	ε Ursæ Minoris	L	5	+0 160	4 57 1 0	−0 4	−0 2	−1 9	0 0	56 58 5	4 56 55 5	− 0 3 0		+ 0 3
				W	Groom 1004	U	5	−0 357	5 44 6 4	+1 0	+1 0	−1 9		6 5	6 4 43 ,	+20 37 2	+ 0 7	
				,,	δ Ursæ Minoris	L	5	+0 358	5 46 18 4	−0 9	−0 7	−1 9	0 0	14 9	6 6 52 6	+20 37 7		
				E	Radcliffe 1811	U	5	−0 274	4 53 39 3	−1 3	0 0	0 0		38 0	4 53 42 1	+ 0 4 1	− 47 8	
		,, 7	*I P W*		ε Ursæ Minoris	L	4	+0 160	4 57 8 4	+0 7	0 0	0 0	0 0	9 1	4 56 55 5	− 0 13 6		− 48 2
					Groom 1004	U	2	−0 357	6 4 36 5	−1 6	0 0	0 0		34 9	6 4 43 7	+ 0 8 8	− 48 5	
				,,	δ Ursæ Minoris	L	2	+0 358	6 7 16 9	+1 6	0 0	0 0	0 0	18 5	6 6 52 6	− 0 25 9		
				E	Radcliffe 1811	U	5	−0 2,4	4 53 43 8	−1 3	−0 1	0 0		42 4	4 53 42 1	− 0 0 3	− 39 9	
		,, 8	*I P W*	,,	ε Ursæ Minoris	L	5	+0 160	4 57 12 4	+0 7	0 0	0 0	0 0	13 1	4 56 55 5	− 0 17 6		− 41 2
					Groom 1004	U	3	−0 357	6 4 42 5	−1 6	−0 2	0 0		40 7	6 4 43 7	+ 0 3 0	− 42 4	
				,	δ Ursæ Minoris	L	3	+0 358	6 7 18 2	+1 6	+0 1	0 0	0 0	19 9	6 6 52 6	− 0 27 3		
				E	Radcliffe 1811	U	4	−0 274	4 53 48 1	+0 8	+0 2	0 0		49 1	4 53 42 1	− 0 7 0	− 45 2	
		, 10	*I P E*	,,	ε Ursæ Minoris	L	5	+0 160	4 57 22 5	−0 4	0 0	0 0	0 0	22 1	4 56 55 5	− 0 26 6		− 47 0
					Groom 1004	U	3	−0 357	6 4 44 7	+1 0	+0 2	0 0		45 9	6 4 43 7	− 0 2 2	− 48 8	
					δ Ursæ Minoris	L	3	+0 358	6 7 30 7	−0 9	−0 1	0 0	0 0	29 7	6 6 52 6	− 0 37 1		
				E	Groom 1004	U	3	−0 357	6 2 15 7	+158 4	−0 4	−1 7		4 52 0	6 4 43 7	− 0 8 3	− 33 9	
		, 11	*I P W*		δ Ursæ Minoris	L	3	+0 358	6 10 3 0	−156 5	+0 3	−1 7	0 0	7 25 1	6 6 52 6	− 0 32 5	− 39 5	− 36 7
					51 Cephei	U	2	−0 417	6 50 8 8	−1 9	−0 4	−1 7	−0 1	4 7	6 50 2 8	− 0 1 9		
				E	Radcliffe 1811	U	4	−0 274	4 54 1 1	−1 3	−0 6	−1 ,		53 57 5	4 53 42 1	− 0 15 4	− 38 0	
		12	*I P W*	,	ε Ursæ Minoris	L	5	+0 160	4 57 28 2	+0 7	+0 2	−1 7	0 0	27 4	4 56 55 5	− 0 31 9		− 39 4
					Groom 1004	U	2	−0 357	6 4 55 6	−1 6	−0 7	+1 7		55 0	6 4 43 7	− 0 11 3	− 40 7	
				,,	δ Ursæ Minoris	L	4	+0 358	6 7 29 2	+1 6	+0 5	+1 7	0 0	33 0	6 6 52 6	− 0 40 4		
	WALTAIR (Latitude 17 43')	1891																
				W	Radcliffe 1811	U	2	−0 285	4 54 49 0	−1 6	−1 8	0 0		45 6	4 53 42 1	− 1 3 5	+235 9	
		Dec 6	*I P E*	,	ε Ursæ Minoris	L	2	+0 163	4 56 12 0	+0 8	+0 5	0 0	0 0	13 3	4 56 55 5	+ 0 42 2		+237 6
				,,	Groom 1004	U	2	−0 370	6 6 12 1	−2 0	−2 2	0 0		7 9	6 4 43 7	− 1 24 2	+239 3	
					δ Ursæ Minoris	L	2	+0 367	6 5 17 0	+1 9	+1 5	0 0	0 0	20 4	6 6 52 6	+ 1 32 2		
				W	Lalan (F) 2774	L	3	+0 285	3 57 19 7	+1 5	+0 6	0 0	0 0	21 8	3 58 49 7	+ 1 27 9	+281 9	
		,, 7	*I P E*	,,	Radcliffe 1811	U	1	−0 285	4 54 57 5	−1 6	−1 0	0 0		54 9	4 53 42 1	− 1 12 8	+275 0	+278 5
				,	ε Ursæ Minoris	L	2	+0 163	4 56 4 0	+0 8	+0 3	0 0	0 0	5 1	4 56 55 5	+ 0 50 4		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No. of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for: Collimation	Corrections for: Level	Corrections for: Pen Equation Q	Corrections for: Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction *a*	Adopted Value of Deviation Correction
									h m s	s	s	s	s	s	h m s	m s	d	d
CALCUTTA (E) AND WALTAIR (W)	WALTAIR (Latitude 17° 43′)	1891 Dec 8	*I P W*														+240 4	+240 4 *
		„ 10	*I P W*	W	Lalan (F) 2774	L	2	+0 285	3 57 18 5	+0 5	0 0	0 0	0 0	19 0	3 58 49 7	+ 1 30 7	+281 1	
					Radcliffe 1811	U	1	−0 285	4 54 52 0	−0 5	+0 1	0 0		51 6	4 53 42 1	− 1 9 5	+279 7	+280 4
					ε Ursæ Minoris	L	2	+0 163	4 55 59 5	+0 3	0 0	0 0	0 0	59 8	4 56 55 5	+ 0 55 7		
		, 11	*I P E*	W	Lalan (F) 2774	L	2	+0 285	3 58 29 0	+1 5	+0 3	0 0	0 0	30 8	3 58 49 7	+ 0 18 9	+ 9 8	
					Groom 1004	U	2	−0 370	6 4 41 5	−2 0	−0 7	0 0		38 8	6 4 51 3	+ 0 12 5	+ 8 3	+ 9 1
					δ Ursæ Minoris	L	2	+0 367	6 6 31 6	+1 9	+0 5	0 0	0 0	34 0	6 6 52 6	+ 0 18 6		
		, 12	*I P W*	W	Lalan (F) 2774	L	2	+0 285	3 58 43 5	+0 5	+0 5	0 0	0 0	44 5	3 58 49 7	+ 0 5 2	− 33 5	
					Radcliffe 1311	U	1	−0 285	4 53 19 2	−0 5	−0 9	0 0		17 8	4 53 42 1	+ 0 24 3	− 38 6	− 36 1
					ε Ursæ Minoris	L	2	+0 163	4 56 48 0	+0 3	+0 2	0 0	0 0	48 5	4 56 55 5	+ 0 7 0		
WALTAIR (E) AND JUBBULPORE (W)	WALTAIR (Latitude 17 43′)	1891 Dec 18	*I P W*														+ 12 0	+ 12 0 *
		„ 19	*I P E*	E	Lalan (Γ) 2774	L	2	+0 285	3 58 13 5	+1 5	+0 1	0 0	0 0	15 1	3 58 50 6	+ 0 35 5	+ 40 4	
					Radcliffe 1311	U	1	−0 285	4 53 31 5	−1 6	−0 1	0 0		29 8	4 53 42 3	+ 0 12 5	+ 40 3	+ 40 4
					Groom 1004	U	2	−0 370	6 4 39 0	−2 1	−0 2	0 0		36 7	6 4 45 6	+ 0 8 9	+ 40 6	
					δ Ursæ Minoris	L	1	+0 367	6 6 10 0	+2 0	+0 2	0 0	0 0	12 2	6 6 51 0	+ 0 38 8		
		20	*I P E*	E	Radcliffe 1311	U	2	−0 285	4 53 30 0	−1 6	−0 2	0 0		28 2	4 53 42 3	+ 0 14 1	+ 40 9	
					Groom 1004	U	2	−0 370	6 4 36 5	−2 1	−0 3	0 0		34 1	6 4 45 6	+ 0 11 5	+ 39 8	+ 40 4
					δ Ursæ Minoris	L	2	+0 367	6 6 8 0	+2 0	+0 2	0 0	0 0	10 2	6 6 51 0	+ 0 40 8		
		„ 21	*I P W*	E	51 Cephei	U	2	−0 432	6 50 2 3	−0 7	−0 9	0 0		0 7	6 50 6 0	+ 0 5 3	+ 54 6	+ 54 6
					Radcliffe 4208	L	2	+0 363	6 49 7 0	+0 6	+0 5	0 0	0 0	8 1	6 49 56 8	+ 0 48 7		
		„ 23	*I P W*	E	Radcliffe 1311	U	1	−0 285	4 53 40 0	−0 5	−0 8	0 0		38 7	4 53 42 3	+ 0 3 6	+101 6	
				,	ε Ursæ Minoris	L	1	+0 163	4 56 6 0	+0 2	−0 2	0 0	0 0	6 4	4 56 55 5	+ 0 49 1		
					Groom 1004	U	2	−0 370	6 4 52 0	−0 6	−1 0	0 0		50 4	6 4 45 6	− 0 4 8	+103 5	+103 8
				,	δ Ursæ Minoris	L	3	+0 367	6 5 38 3	+0 6	+0 6	0 0	0 0	39 5	6 6 51 0	+ 1 11 5		
				,	51 Cephei	U	2	−0 432	6 50 21 8	−0 7	−1 1	0 0		20 0	6 50 6 0	− 0 14 0	+106 4	
					Radcliffe 4208	L	2	+0 363	6 48 45 0	+0 6	+0 6	0 0	0 0	46 2	6 49 56 8	+ 1 10 6		
		„ 24	*I P W*	E	Radcliffe 1311	U	1	−0 285	4 53 44 0	−0 5	−0 8	0 0		42 7	4 53 42 3	− 0 0 4	+119 3	
					Groom 1004	U	2	−0 370	6 4 58 3	−0 6	−1 0	0 0		56 7	6 4 45 6	− 0 11 1	+120 1	+119 7
				,	δ Ursæ Minoris	L	2	+0 367	6 5 32 3	+0 6	+0 7	0 0	0 0	33 6	6 6 51 0	+ 1 17 4		

* No star observations were taken for the determination of the deviation correction: it had therefore to be deduced from the readings of two collimators which were found to have remained immovable

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pendulum Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a	Adopted Value of Deviation Correction
		1891							h m s	s	s	s	s	s	h m s	m s	d	d
WALTAIR (E) AND JUBBULPORE (W)	JUBBULPORE (Latitude 23 10′)			W	Groom 1004	U	3	−0 355	6 4 14 5	+2 9	+1 1	0 0		18 5	6 4 45 6	+ 0 27 1	− 13 1	− 12 8
		Dec 18	*I P E*		δ Ursæ Minoris	L	6	+0 357	6 6 36 7	−2 7	−0 8	0 0	0 0	33 2	6 6 51 0	+ 0 17 8		
					51 Cephei	U	3	−0 415	6 49 33 1	+3 3	+1 3	0 0		37 7	6 50 6 0	+ 0 28 3	− 12 5	
					Radcliffe 4208	L	3	+0 352	6 49 41 6	−2 7	−0 8	0 0	0 0	38 1	6 49 56 8	+ 0 18 7		
				E	Radcliffe 1311	U	4	−0 273	5 6 52 4	+2 2	+1 1	0 0		55 7	4 53 42 3	−13 13 4	− 13 4	− 15 5
		„ 19	*I P E*	„	ε Ursæ Minoris	L	8	+0 159	5 10 16 2	−1 2	−0 3	0 0	0 0	14 7	4 56 55 5	−13 19 2		
				W	Groom 1004	U	3	−0 355	6 4 13 5	+2 9	+1 4	0 0		17 8	6 4 45 6	+ 0 27 8	− 17 6	
				„	δ Ursæ Minoris	L	3	+0 357	6 6 39 4	−2 7	−1 0	0 0	0 0	35 7	6 6 51 0	+ 0 15 3		
				E	Radcliffe 1311	U	4	−0 273	5 6 60 7	−2 7	−1 0	+1 7		58 7	4 53 42 3	−13 16 4	− 20 6	− 19 8
		„ 20	*I P W*	„	ε Ursæ Minoris	L	6	+0 159	5 10 17 3	+1 5	+0 3	+1 7	0 0	20 8	4 56 55 5	−13 25 3		
				W	Groom 1004	U	4	−0 355	6 4 22 3	−3 5	−1 3	+1 7		19 2	6 4 45 6	+ 0 27 4	− 19 0	
					δ Ursæ Minoris	L	4	+0 357	6 6 31 2	+3 3	+0 9	+1 7	0 0	37 1	6 6 51 0	+ 0 13 9		
				E	Radcliffe 1311	U	3	−0 273	5 7 4 6	−2 7	−1 2	+1 7		2 4	4 53 42 3	−13 20 1	− 19 0	− 17 2
		21	*I P W*	„	ε Ursæ Minoris	L	4	+0 159	5 10 20 2	+1 5	+0 4	+1 7	0 0	23 8	4 56 55 5	−13 28 3		
				W	Groom 1004	U	4	−0 355	6 4 24 1	−3 5	−1 5	+1 7		20 8	6 4 45 6	+ 0 24 8	− 15 3	
					δ Ursæ Minoris	L	3	+0 357	6 6 31 0	+3 3	+1 1	+1 7	0 0	37 1	6 6 51 0	+ 0 13 9		
				E	Radcliffe 1311	U	4	−0 273	4 58 48 1	−2 7	−1 2	+1 7		45 9	4 53 42 3	− 5 3 6	− 16 9	− 17 7
		„ 23	*I P W*		ε Ursæ Minoris	L	4	+0 159	5 2 2 8	+1 5	+0 4	+1 7	0 0	6 4	4 56 55 5	− 5 10 9		
				W	Groom 1004	U	3	−0 355	6 4 24 2	−3 5	−1 5	+1 7		20 9	6 4 45 6	+ 0 24 7	− 18 4	
					δ Ursæ Minoris	L	1	+0 357	6 6 33 3	+3 3	+1 1	+1 7	0 0	39 4	6 6 51 0	+ 0 11 6		
				W	Radcliffe 1311	U	4	−0 273	4 53 16 3	+2 2	−0 1	+1 7		20 1	4 53 42 3	+ 0 22 2	− 17 6	− 18 0
		„ 24	*I P E*		ε Ursæ Minoris	L	4	+0 159	4 56 40 4	−1 2	0 0	+1 7	0 0	40 9	4 56 55 5	+ 0 14 6		
					Groom 1004	U	5	−0 355	6 4 16 3	+2 9	−0 1	+1 7		20 8	6 4 45 6	+ 0 24 8	− 18 4	
					δ Ursæ Minoris	L	3	+0 357	6 6 40 2	−2 7	+0 1	+1 7	0 0	39 3	6 6 51 0	+ 0 11 7		
		1892																
WALTAIR (E) AND MADRAS (W)	WALTAIR (Latitude 17 43)			E	Groom 1004	U	2	−0 371	6 4 57 0	−2 1	−0 6	0 0		54 3	6 4 46 5	− 0 7 8	+162 9	+162 0
		Jan 6	*I P W*		δ Ursæ Minoris	L	2	+0 367	6 4 56 0	+2 0	+0 4	0 0	0 0	58 4	6 6 50 8	+ 1 52 4		
				„	51 Cephei	U	2	−0 432	6 50 28 3	−2 5	−0 7	0 0		25 1	6 50 8 2	− 0 16 9	+161 1	
				„	Radcliffe 4208	L	2	+0 363	6 48 1 6	+2 0	+0 4	0 0	0 0	4 0	6 49 55 2	+ 1 51 2		
				E	Groom 1004	U	2	−0 371	6 4 56 5	+1 4	+1 1	0 0		59 0	6 4 46 5	− 0 12 5	+179 4	+180 2
		„ 7	*I P E*		δ Ursæ Minoris	L	2	+0 367	6 4 53 0	−1 4	−0 7	0 0	0 0	50 9	6 6 50 8	+ 1 59 9		
				„	51 Cephei	U	2	−0 432	6 50 28 0	+1 7	+1 2	0 0		30 9	6 50 8 2	− 0 22 7	+181 0	
				„	Radcliffe 4208	L	1	+0 363	6 47 56 0	−1 3	−0 7	0 0	0 0	54 0	6 49 55 2	+ 2 1 2		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a	Adopted Value of Deviation Correction
WALTAIR (E) AND MADRAS (W)	WALTAIR (Latitude 17° 43')	1892							h m s	s	s	s	s	s	h m s	m s	d	d
		Jan 10	*I P E*	E	Groom 1004	U	2	−0 371	6 5 8 1	−0 6	+0 9	0 0		8 4	6 4 46 5	− 0 21 9	+221 3	
				,,	δ Ursæ Minoris	L	2	+0 367	6 4 29 5	+0 5	−0 6	0 0	0 0	29 4	6 6 50 8	+ 2 21 4		+220 3
				,,	51 Cephei	U	2	−0 432	6 50 42 5	−0 6	+1 0	0 0		42 9	6 50 8 2	− 0 34 7	+219 2	
				,,	Radcliffe 4208	L	1	+0 363	6 47 35 5	+0 5	−0 6	0 0	0 0	35 4	6 49 55 2	+ 2 19 8		
		,, 11	*I P W*	E	Groom 1004	U	2	−0 371	6 5 13 5	−0 2	+0 7	0 0		14 0	6 4 46 5	− 0 27 5	+240 0	
					δ Ursæ Minoris	L	2	+0 367	6 4 21 5	+0 2	−0 5	0 0	0 0	21 2	6 6 50 8	+ 2 29 6		+237 6
				,,	51 Cephei	U	2	−0 432	6 50 45 5	−0 2	+0 8	0 0		46 1	6 50 8 2	− 0 37 9	+235 1	
				,	Radcliffe 4208	L	2	+0 363	6 47 26 5	+0 1	−0 4	0 0	0 0	26 2	6 49 55 2	+ 2 29 0		
	MADRAS (Latitude 13 4')	1892																
		Jan 6	*I P E*	E	δ Ursæ Minoris	L	2	+0 373	6 18 59 1	−2 8	−0 1	−1 7		54 5	6 6 50 8	−12 3 7	+ 49 5	+ 49 5
				,,	51 Cephei	U	1	−0 444	7 2 47 0	+3 5	+0 2	+1 7	−0 1	52 3	6 50 8 2	−12 44 1		
		7	*I P E*	E	Groom 1004	U	4	−0 381	6 17 25 0	+1 0	0 0	+1 8		27 8	6 4 46 5	−12 41 3	+ 44 2	
					δ Ursæ Minoris	L	4	+0 373	6 18 57 9	−0 9	0 0	+1 8	0 0	58 8	6 6 50 8	−12 8 0	+ 44 6	+ 44 4
				,	51 Cephei	U	2	−0 444	7 2 49 6	+1 2	0 0	+1 8		52 6	6 50 8 2	−12 44 4		
		, 10	*I P W*	E	Groom 1004	U	4	−0 381	6 17 17 0	−1 7	−0 7	+1 7		16 3	6 4 46 5	−12 29 8	− 10 0	
					δ Ursæ Minoris	L	4	+0 373	6 19 24 4	+1 6	+0 4	+1 7	0 0	28 1	6 6 50 8	−12 37 3	− 9 2	− 9 6
					51 Cephei	U	4	−0 444	, 2 39 2	−2 0	−0 8	+1 7	−0 1	38 0	6 50 8 2	−12 29 8		
		, 11	*I P W*	E	Groom 1004	U	5	−0 381	6 17 17 8	−1 7	−0 6	+1 7		17 2	6 4 46 5	−12 30 7	− 18 0	
					δ Ursæ Minoris	L	4	+0 373	6 19 31 4	+1 6	+0 4	+1 7	0 0	35 1	6 6 50 8	−12 44 3	− 15 3	− 16 7
					51 Cephei	U	4	−0 444	7 2 41 1	−2 0	−0 ,	+1 7	−0 1	40 0	6 50 8 2	−12 31 8		
WALTAIR (E) AND BOLARUM (W)	WALTAIR (Latitude 17° 43')	1892																
		Jan 18	*I P W*	E	51 Cephei	U	2	−0 432	6 52 11 5	+0 5	−0 3	0 0		11 7	6 50 8 3	− 2 3 4	+318 9	
				,	Radcliffe 4208	L	2	+0 363	6 47 45 5	−0 4	+0 2	0 0	0 0	45 3	6 49 55 4	+ 2 10 1	+319 4	
				,,	Groom 1119	U	3	−1 165	7 56 10 0	+1 4	−0 8	0 0		10 6	7 50 9 4	− 6 1 2	+319 5	+318 8
				,,	λ Ursæ Minoris	L	2	+1 192	7 23 43 0	−1 4	+0 7	0 0	0 0	42 3	, 30 14 0	+ 6 31 7	+317 2	
				,	Groom. 3212	L	2	+0 223	8 13 25 9	−0 3	+0 1	0 0	0 0	25 7	8 14 51 6	+ 1 25 9		
		, 19	*I P E*	E	51 Cephei	U	2	−0 432	6 49 44 5	−1 3	−0 5	0 0		42 7	6 50 8 3	+ 0 25 6	− 20 9	
				,,	Radcliffe 4208	L	2	+0 363	6 49 45 0	+1 1	+0 3	0 0	0 0	46 4	6 49 55 4	+ 0 9 0		− 21 3
				,	Groom 1119	U	2	−1 165	7 49 34 5	−3 6	−1 2	0 0		29 7	7 50 9 4	+ 0 39 7	− 21 6	
				,,	λ Ursæ Minoris	L	2	+1 192	7 30 20 5	+3 6	+1 1	0 0	0 0	25 2	7 30 14 0	− 0 11 2		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a	Adopted Value of Deviation Correction
									h m s	s	s	s	s	s	h m s	m s	d	d
WALTAIR (E) AND BOLARUM (W)	WALTAIR (Latitude 17° 43')	1892																
				E	51 Cephei	U	2	−0 432	6 49 45 4	−1 3	−0 6	0 0		43 5	6 50 8 3	+ 0 24 8	− 14 8	
		Jan 20	*I P E*	"	Radcliffe 4208	L	2	+0 363	6 49 41 0	+1 1	+0 3	0 0	0 0	42 4	6 49 55 4	+ 0 13 0		− 13 2
				"	Groom 1119	U	2	−1 165	7 49 44 5	−3 6	−1 3	0 0		39 6	7 50 9 4	+ 0 29 8	− 11 5	
				,	λ Ursæ Minoris	L	2	+1 192	7 30 6 5	+3 6	+1 2	0 0	0 0	11 3	7 30 14 0	+ 0 2 7		
				E	51 Cephei	U	2	−0 432	6 49 41 5	+0 5	−0 4	0 0		41 6	6 50 8 3	+ 0 26 7	− 10 8	
		" 21	*I P W*	"	Radcliffe 4208	L	2	+0 363	6 49 37 5	−0 4	+0 2	0 0	0 0	37 3	6 49 55 4	+ 0 18 1		− 6 6
				,	Groom 1119	U	3	−1 165	7 49 50 3	+1 4	−1 0	0 0		50 7	7 50 9 4	+ 0 18 7	− 2 3	
				,	λ Ursæ Minoris	L	3	+1 192	7 30 1 3	−1 4	+0 9	0 0	0 0	0 8	7 30 14 0	+ 0 13 2		
				E	51 Cephei	U	3	−0 432	6 49 45 3	+0 5	−0 6	0 0		45 2	6 50 8 3	+ 0 23 1		
		" 22	*I P W*	"	Radcliffe 4208	L	4	+0 363	6 49 29 8	−0 4	+0 3	0 0	0 0	29 7	6 49 55 4	+ 0 25 7	+ 3 3	+ 3 3
				E	51 Cephei	U	3	−0 432	6 49 41 0	−1 3	−0 8	0 0		38 9	6 50 8 3	+ 0 29 4	− 9 2	
		" 23	*I P E*	"	Radcliffe 4208	L	3	+0 363	6 49 31 7	+1 1	+0 5	0 0	0 0	33 3	6 49 55 4	+ 0 22 1	− 10 7	− 10 0
				"	Groom 1418	U	2	−0 261	8 22 59 1	−0 8	−0 5	0 0		57 8	8 23 26 7	+ 0 28 9		
	BOLARUM (Latitude 17° 30')	1892																
				E	51 Cephei	U	4	−0 433	7 9 59 9	+0 5	−0 5	+1 7		61 6	6 50 8 3	−19 53 3	− 2 5	
		Jan 18	*I P E*		Radcliffe 4208	L	5	+0 363	7 9 49 1	−0 4	+0 3	+1 7	0 0	50 7	6 49 55 4	−19 55 3		− 2 2
				W	λ Ursæ Minoris	L	2	+1 193	7 30 12 6	−1 2	+1 2	+1 7		14 3	7 30 14 0	− 0 0 3	− 1 8	
				,	Groom 1119	U	1	−1 166	7 50 3 9	+1 2	−1 3	+1 7	0 0	5 5	7 50 9 4	+ 0 3 9		
				E	51 Cephei	U	3	−0 433	7 9 57 8	+0 5	−0 5	+1 7		59 5	6 50 8 3	−19 51 2		
		" 19	*I P E*	,	Radcliffe 4208	L	4	+0 363	7 9 36 5	−0 4	+0 3	+1 7	0 0	38 1	6 49 55 4	−19 42 7	+ 10 7	+ 10 7
				W	51 Cephei	U	3	−0 433	6 50 10 5	−1 3	−0 7	+1 7		10 2	6 50 8 3	− 0 1 9	+ 19 7	
		" 20	*I P W*	"	Radcliffe 4208	L	4	+0 363	6 49 38 5	+1 0	+0 4	+1 7	0 0	41 6	6 49 55 4	+ 0 13 8		+ 21 6
				,	λ Ursæ Minoris	L	2	+1 193	7 29 35 7	+3 5	+1 5	+1 7		42 4	7 30 14 0	+ 0 31 6	+ 23 4	
				"	Groom. 1119	U	1	−1 166	7 50 36 4	−3 4	−1 6	+1 7	0 0	33 1	7 50 9 4	− 0 23 7		
				E	51 Cephei	U	2	−0 433	7 10 9 9	−1 3	−0 8	+1 7		9 5	6 50 8 3	−20 1 2	+ 29 7	
		" 21	*I P W*	"	Radcliffe 4208	L	2	+0 363	7 9 29 9	+1 0	+0 4	+1 7	0 0	33 0	6 49 55 4	−19 37 6		+ 31 8
				W	λ Ursæ Minoris	L	1	+1 193	7 29 24 6	+3 5	+1 7	+1 7		31 5	7 30 14 0	+ 0 42 5	+ 33 9	
					Groom 1119	U	1	−1 166	7 50 50 5	−3 4	−1 8	+1 7	0 0	47 0	7 50 9 4	− 0 37 6		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for				Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction *a*	Adopted Value of Deviation Correction
										Collimation	Level	Pendulum Equation Q	Approximate Clock Rate					
									h m s	s	s	s	s	s	h m s	m s	d	d
WALTAIR (E) AND BOLARUM (W)	BOLARUM (Latitude (17° 30′)	1892																
				E	51 Cephei	U	2	−0 433	7 9 53 1	+0 5	−0 1	+1 7		55 2	6 50 8 3	−19 46 9	− 9 2	
		Jan 22	*I P E*	,	Radcliffe 4208	L	3	+0 363	7 9 48 2	−0 4	+0 1	+1 7	0 0	49 6	6 49 55 4	−19 54 2		− 8 6
				W	λ Ursæ Minoris	L	1	+1 193	7 30 15 0	−1 2	+0 3	+1 7		15 8	7 30 14 0	+ 0 1 8	− 8 0	
				,	Groom 1418	U	3	−0 261	8 23 18 5	+0 3	−0 1	−1 7	0 0	17 0	8 23 26 7	+ 0 9 7		
				E	51 Cephei	U	2	−0 433	7 10 0 0	+0 5	0 0	+1 7		2 2	6 50 8 3	−19 53 9	− 1 5	
		„ 23	*I P E*		Radcliffe 4208	L	3	+0 363	7 9 49 2	−0 4	0 0	+1 7	0 0	50 5	6 49 55 4	−19 55 1		+ 0 2
				W	λ Ursæ Minoris	L	2	+1 193	7 30 8 8	−1 2	0 0	+1 7		9 3	7 30 14 0	+ 0 4 7	+ 1 9	
					Groom 1119	U	2	−1 166	7 50 6 3	+1 2	0 0	+1 7	0 0	9 2	7 50 9 4	+ 0 0 2		
BOLARUM (E) AND BOMBAY (W)	BOLARUM (Latitude 17° 30′)	1892																
				E	Radcliffe 4208	L	3	+0 363	6 49 23 9	−0 3	−0 6	+1 7		24 7	6 49 58 4	+ 0 33 7	+105 2	
		Feb 9	*I P E*		Piazzi VI 292	U	6	−0 158	7 8 46 0	+0 2	+0 4	+1 7	0 0	48 3	7 8 27 1	− 0 21 2		+107 5
					λ Ursæ Minoris	L	2	+1 191	7 28 23 1	−1 2	−2 1	−1 7		18 2	7 30 18 9	+ 2 0 7	+109 8	
					Groom 1119	U	2	−1 169	7 52 21 3	+1 1	+2 4	−1 7	0 0	23 1	7 50 4 5	− 2 18 6		
				E	Radcliffe 4208	L	3	+0 363	6 50 22 5	+1 0	+0 2	+1 7		25 4	6 49 58 4	− 0 27 0	− 62 4	
		„ 10	*I P W*		Piazzi VI 292	U	6	−0 158	7 8 20 6	−0 5	−0 2	+1 7	0 0	21 6	7 8 27 1	+ 0 5 5		− 59 7
				,	λ Ursæ Minoris	L	1	+1 191	7 31 33 6	+3 3	+0 7	−1 7		35 9	7 30 18 9	− 1 17 0	− 56 9	
					Groom 1119	U	2	−1 169	7 49 13 0	−3 3	−0 8	−1 7	0 0	7 2	7 50 4 5	+ 0 57 3		
				E	Radcliffe 4208	L	4	+0 363	6 50 23 1	+1 0	+0 2	+1 7		26 0	6 49 58 4	− 0 27 6	− 60 1	
		, 11	*I P W*		Piazzi VI 292	U	4	−0 158	7 8 22 3	−0 5	−0 1	+1 7	0 0	23 4	7 8 27 1	+ 0 3 7		− 59 0
				,	λ Ursæ Minoris	L	1	+1 191	7 31 35 5	+3 3	+0 7	−1 7		37 8	7 30 18 9	− 1 18 9	− 57 9	
					Groom 1119	U	2	−1 169	7 49 12 4	−3 3	−0 7	−1 7	0 0	6 7	7 50 4 5	+ 0 57 8		
		„ 12	*I P E*	E	Radcliffe 4208	L	2	+0 363	6 50 22 8	−0 3	0 0	+1 7		24 2	6 49 58 4	− 0 25 8	− 54 6	− 54 6
					Piazzi VI 292	U	3	−0 158	7 8 22 5	+0 2	0 0	+1 7	0 0	24 4	7 8 27 1	+ 0 2 7		
				E	Radcliffe 4208	L	3	+0 363	6 50 23 9	−0 3	0 0	+1 7		25 3	6 49 58 4	− 0 26 9	− 56 0	
		, 13	*I P E*	,	Piazzi VI 292	U	3	−0 158	7 8 22 4	+0 2	0 0	+1 7	0 0	24 3	7 8 27 1	+ 0 2 8		− 52 8
				,	λ Ursæ Minoris	L	1	+1 191	7 31 29 7	−1 1	+0 1	−1 7		27 0	7 30 18 9	− 1 8 1	− 49 5	
				„	Groom 1119	U	2	−1 169	7 49 16 6	+1 1	−0 1	−1 7	0 0	15 9	7 50 4 5	+ 0 48 6		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for: Collimation	Level	Pen Equation Q	Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction *a*	Adopted Value of Deviation Correction
	BOLARUM (Latitude 17° 30')	1892							h m s	s	s	s	s	s	h m s	m s	d	d
				E	Radcliffe 4208	L	1	+0 363	6 50 23 3	+0 2	−0 1	+1 5		24 9	6 49 58 4	− 0 26 5	− 54 3	
		Feb 14	*I P W*	„	Piazzi VI 292	U	3	−0 158	7 8 23 8	−0 1	+0 1	+1 5	0 0	25 3	7 8 27 1	+ 0 1 8		− 50 9
				„	λ Ursæ Minoris	L	1	+1 191	7 31 28 6	+0 6	−0 3	−1 5		27 4	7 30 18 9	− 1 8 5	− 47 5	
				„	Groom 1119	U	1	−1 169	7 49 22 7	−0 6	+0 4	−1 5	0 0	21 0	7 50 4 5	+ 0 43 5		
BOLARUM (E) AND BOMBAY (W)	BOMBAY (Latitude 18 54')	1892																
				W	Radcliffe 4209	L	3	+0 360	6 49 46 7	+0 4	+0 4	0 0	0 0	47 5	6 49 58 4	+ 0 10 9	− 55 2	
		Feb 9	*I P E*		Piazzi VI 292	U	3	−0 156	7 7 48 2	−0 2	−0 3	0 0		47 7	7 8 27 1	+ 0 39 4		− 54 2
				„	λ Ursæ Minoris	L	2	+1 182	7 30 52 0	+1 4	+1 7	0 0	0 0	55 1	7 30 18 9	− 0 36 2	− 53 2	
				„	Groom 1119	U	2	−1 159	7 48 39 5	−1 4	−1 8	0 0		36 3	7 50 4 5	+ 1 28 2		
				W	Radcliffe 4208	L	3	+0 360	6 49 47 1	+0 4	+0 1	0 0	0 0	47 6	6 49 58 4	+ 0 10 8	− 60 3	
		„ 10	*I P E*	,	Piazzi VI 292	U	3	−0 156	7 7 45 5	−0 2	−0 1	0 0		45 2	7 8 27 1	+ 0 41 9		− 59 2
				„	λ Ursæ Minoris	L	2	+1 182	7 30 57 5	+1 4	+0 4	0 0	0 0	59 3	7 30 18 9	− 0 40 4	− 58 0	
					Groom 1119	U	2	−1 159	7 48 31 0	−1 4	−0 5	0 0		29 1	7 50 4 5	+ 1 35 4		
				W	Radcliffe 4208	L	2	+0 360	6 49 42 5	+0 3	+0 3	0 0	0 0	43 1	6 49 58 4	+ 0 15 3	− 55 8	
		11	*I P W*		Piazzi VI 292	U	3	−0 156	7 7 43 3	−0 1	−0 2	0 0		43 0	7 8 27 1	+ 0 44 1		− 54 4
					λ Ursæ Minoris	L	2	+1 182	7 30 47 0	+0 9	+1 0	0 0	0 0	48 9	7 30 18 9	− 0 30 0	− 53 0	
				„	Groom 1119	U	2	−1 159	7 48 32 5	−0 9	−1 1	0 0		30 5	7 50 4 5	+ 1 34 0		
				W	Radcliffe 4208	L	3	+0 360	6 49 41 3	+0 3	+0 2	0 0	0 0	41 8	6 49 58 4	+ 0 16 6	− 58 3	
		12	*I P W*	,	Piazzi VI 292	U	3	−0 156	7 7 40 7	−0 1	−0 2	0 0		40 4	7 8 27 1	+ 0 46 7		− 55 7
				,	λ Ursæ Minoris	L	1	+1 182	7 30 47 0	+0 9	+0 9	0 0	0 0	48 8	7 30 18 9	− 0 29 9	− 53 1	
				„	Groom 1119	U	1	−1 159	7 48 32 0	−0 9	−1 0	0 0		30 1	7 50 4 5	+ 1 34 4		
				W	Radcliffe 4208	L	3	+0 360	6 49 39 2	+0 4	+0 4	0 0	0 0	40 0	6 49 58 4	+ 0 18 4	− 59 0	
		, 13	*I P E*	„	Piazzi VI 292	U	3	−0 156	7 7 38 8	−0 2	−0 3	0 0		38 3	7 8 27 1	+ 0 48 8		− 58 1
				„	λ Ursæ Minoris	L	1	+1 182	7 30 46 0	+1 4	+1 6	0 0	0 0	49 0	7 30 18 9	− 0 30 1	− 57 2	
				„	Groom 1119	U	1	−1 159	7 48 24 0	−1 4	−1 8	0 0		20 8	7 50 4 5	+ 1 43 7		
				W	Radcliffe 4208	L	3	+0 360	6 49 37 0	+0 4	+0 4	0 0	0 0	37 8	6 49 58 4	+ 0 20 6	− 59 7	
		, 14	*I P E*		Piazzi VI 292	U	3	−0 156	7 7 36 2	−0 2	−0 3	0 0		35 7	7 8 27 1	+ 0 51 4		− 60 5
				„	λ Ursæ Minoris	L	2	+1 182	7 30 50 5	+1 4	+1 4	0 0	0 0	53 3	7 30 18 9	− 0 34 4	− 61 3	
					Groom 1119	U	2	−1 159	7 48 18 5	−1 4	−1 6	0 0		15 5	7 50 4 5	+ 1 49 0		

Arc	Station	Astronomical Date	Instrumental Position	Clock in use	Star	Culmination	No of Wires Observed	Deviation Constant A	Observed Time of Transit	Corrections for Collimation	Corrections for Level	Corrections for Pen Equation Q	Corrections for Approximate Clock Rate	Seconds of Corrected Time of Transit	Right Ascension (Increased by 12 hours for Lower Culmination)	Apparent Clock Corrections	Deduced Value of Deviation Correction a	Adopted Value of Deviation Correction
FYZABAD (E) AND DEHRA DÚN (W)	FYZABAD (Latitude 26 47)	1892							h m s	s	s	s	s	s	h m s	m s	d	d
				E	Bradley 1399	U	2	−0 210	10 13 29 4	+1 0	+0 5	+1 5		32 4	10 14 9 0	+ 0 36 6		
					, 2993	L	4	+0 268	10 21 44 4	−1 1	−0 4	+1 5	0 0	44 4	10 21 31 7	− 0 12 7	−103 1	
		Mar 15	*I P E*	,	" 3058	L	3	+0 193	10 55 8 7	−0 8	−0 3	−1 5	0 0	6 1	10 54 59 9	− 0 6 2	−106 2	−105 7
				W	" 3194	L	3	+0 304	11 38 15 1	−1 3	−0 5	−1 5		11 8	11 53 58 9	+15 47 1		
				,	Groom 1850	U	2	−0 290	11 42 52 4	+1 3	+0 6	−1 5	0 0	52 8	11 59 44 0	+16 51 2	−107 9	
				E	Bradley 1399	U	4	−0 210	10 13 42 8	−1 4	+0 2	+1 4		43 0	10 14 9 0	+ 0 26 0		
				"	" 2993	L	4	+0 268	10 21 30 8	+1 6	−0 2	+1 4	0 0	33 6	10 21 31 7	− 0 1 9	− 58 4	
		16	*I P W*	"	" 3058	L	3	+0 193	10 54 59 0	+1 1	−0 1	−1 4	0 0	58 6	10 54 59 9	+ 0 1 3	− 61 3	− 62 2
				W	, 3194	L	3	+0 304	11 38 4 0	+1 8	−0 2	−1 4		4 2	11 53 58 9	+15 54 7		
					Groom 1850	U	3	−0 290	11 43 12 6	−1 9	+0 3	−1 4	0 0	9 6	11 59 44 0	+16 34 4	− 66 8	
				E	Bradley 1399	U	4	−0 210	10 13 42 2	−1 4	+0 2	+1 5		42 5	10 14 9 0	+ 0 26 5		
				,	" 2993	L	3	+0 268	10 21 32 7	+1 6	−0 1	+1 5	0 0	35 7	10 21 31 7	− 0 4 0	− 63 8	
		" 17	*I P W*		" 3058	L	3	+0 193	10 55 0 9	+1 1	−0 1	−1 5	0 0	0 4	10 54 59 9	− 0 0 5	− 67 0	− 66 3
				W	, 3194	L	3	+0 304	11 38 7 0	+1 8	−0 2	−1 5		7 1	11 53 58 9	+15 51 8		
				,	Groom 1850	U	3	−0 290	11 43 14 9	−1 9	+0 2	−1 5	0 0	11 7	11 59 44 0	+16 32 3	− 68 2	
				E	Bradley 1399	U	5	−0 210	10 13 39 5	+1 0	+0 3	+1 5		42 3	10 14 9 0	+ 0 26 7		
					, 2993	L	4	+0 268	10 21 39 5	−1 1	−0 3	+1 5	0 0	39 6	10 21 31 7	− 0 7 9	− 72 4	
		18	*I P E*		3058	L	3	+0 193	10 55 5 2	−0 8	−0 2	−1 5	0 0	2 7	10 54 59 9	− 0 2 8	− 73 2	− 74 5
				W	3194	L	3	+0 304	11 38 16 6	−1 3	−0 3	−1 5		13 5	11 53 58 9	+15 45 4		
					Groom 1850	U	3	−0 290	11 43 12 1	+1 3	+0 4	−1 5	0 0	12 3	11 59 44 0	+16 31 7	− 78 0	
				F	Bradley 1399	U	3	−0 210	10 13 41 0	+1 0	+0 4	+1 5		43 9	10 14 9 0	+ 0 25 1		
					2993	L	3	+0 268	10 21 40 0	−1 1	−0 3	+1 5	0 0	40 1	10 21 31 7	− 0 8 4	− ,0 1	
		19	*I P E*		3058	L	3	+0 193	10 55 6 3	−0 8	−0 2	−1 5	0 0	3 8	10 54 59 9	− 0 3 9	− 72 0	− 71 9
				W	3194	L	3	+0 304	11 38 17 8	−1 3	−0 4	−1 5		14 6	11 53 58 9	+15 44 3		
					Groom 1850	U	3	−0 290	11 43 15 7	+1 3	+0 5	−1 5	0 0	16 0	11 59 44 0	+16 28 0	− 73 6	
				E	Bradley 1399	U	2	−0 210	10 13 41 0	−1 4	+0 4	+1 5		41 5	10 14 9 0	+ 0 27 5		
				,	, 2993	L	3	+0 268	10 21 43 3	+1 6	−0 3	+1 5	0 0	46 1	10 21 31 7	− 0 14 4	− 87 7	
		, 20	*I P W*		3058	L	3	+0 193	10 55 9 7	+1 1	−0 2	−1 5	0 0	9 1	10 54 59 9	− 0 9 2	− 91 1	− 90 3
				W	, 3194	L	3	+0 304	11 38 22 9	+1 8	−0 4	−1 5		22 8	11 53 58 9	+15 36 1		
				"	Groom 1850	U	3	−0 290	11 43 16 2	−1 9	+0 5	−1 5	0 0	13 3	11 59 44 0	+16 30 7	− 92 0	

The Deviation corrections at Dehra Dun for this Arc were derived from intersections of a Meridian Mark, and are given on page 26 of Part I, of this Volume

Between Captain Burrard and Lieutenant Lenox-Conyngham

By Stars of	At KARACHI (Latitude 24 51′)						At BOMBAY (Latitude 18° 54′)								
	November 9 1891			November 10, 1891			February 17 1892			February 18, 1892			February 19 1892		
	Star	Declination	Equation (B − C)	Star	Declination	Equation (B − C)	Star	Declination	Equation (B − C)	Star	Declination	Equation (B − C)	Star	Declination	Equation (B − C)
		°	″			″		°	″		°	″		° ′	″
North Aspect	377	+ 42 22	−0 19	441	+ 46 27	−0 14	2343	+ 27 2	−0 34	2343	+ 27 2	−0 34	2410	+ 22 11	−0 16
	401	+ 28 11	−0 15	492	+ 43 50	−0 23	2374	+ 28 5	−0 25	2374	+ 28 5	−0 25	2429	+ 40 53	−0 25
	425	+ 42 54	−0 22	522	+ 50 9	−0 11	2410	+ 22 11	−0 16	2410	+ 22 11	−0 16	2440	+ 27 51	−0 24
	441	+ 46 27	−0 13	566	+ 40 12	−0 31	2416	+ 36 58	−0 34	2416	+ 36 58	−0 18	2472	+ 28 8	−0 23
	465	+ 36 41	−0 08	624	+ 32 46	−0 32	2429	+ 40 53	−0 26	2429	+ 40 53	−0 31			−0 23
	480	+ 40 52	−0 16	649	+ 37 21	−0 28	2440	+ 27 51	−0 36	2440	+ 27 51	−0 17	2499	+ 20 24	−0 31
	510	+ 42 4	−0 14	691	+ 32 52	−0 11	2472	+ 28 8	−0 25	2472	+ 28 8	−0 28	2509	+ 34 50	−0 23
	522	+ 50 9	−0 04	705	+ 48 28	−0 18			−0 33	2499	+ 20 24	−0 25	2540	+ 29 9	−0 14
	544	+ 37 25	−0 17	727	+ 40 55	−0 15	2499	+ 20 24	−0 36	2509	+ 34 50	−0 19	2578	+ 23 25	−0 20
	566	+ 40 12	−0 22	819	+ 53 4	−0 12	2517	+ 32 16	−0 26	2540	+ 29 9	−0 12	2592	+ 33 30	−0 28
	587	+ 46 34	−0 31	858	+ 56 39	−0 30	2540	+ 29 9	−0 26	2578	+ 23 25	−0 23	2605	+ 19 36	−0 18
	614	+ 53 58	−0 04				2578	+ 23 25	−0 19	2592	+ 33 30	−0 31	2617	+ 27 3	−0 25
							2592	+ 33 30	−0 33	2605	+ 19 36	−0 27	2632	+ 20 10	−0 27
							2632	+ 20 10	−0 28	2617	+ 27 3	−0 31	2714	+ 21 54	−0 29
							2714	+ 21 54	−0 27	2632	+ 20 10	−0 22	2784	+ 32 48	−0 29
							2784	+ 32 48	−0 33	2714	+ 21 54	−0 21	2786	+ 27 34	−0 21
	Mean $(B_N - C_N)$		−0 154			−0 205			−0 286			−0 238			−0 234
South Aspect	418	+ 17 15	−0 30	459	+ 11 20	−0 30	2330	+ 16 6	−0 25	2322	+ 9 21	−0 25	2451	+ 9 29	−0 23
	431	+ 18 41	−0 12	488	+ 11 35	−0 28	2358	− 6 19	−0 30	2330	+ 16 6	−0 21	2462	+ 8 30	−0 19
	437	+ 4 48	−0 14	533	+ 19 33	−0 33	2308	+ 16 44	−0 26	2358	− 0 19	−0 24	2487	+ 3 31	−0 25
	500	+ 15 52	−0 22	538	+ 16 53	−0 31	2451	+ 9 29	−0 24	2398	+ 16 44	−0 21	2491	+ 3 36	−0 28
	533	+ 19 33	−0 14	556	+ 21 55	−0 27	2462	+ 8 30	−0 22	2451	+ 9 29	−0 25	2526	+ 5 29	−0 31
	538	+ 16 53	−0 20	561	+ 10 31	−0 25	2480	+ 2 9	−0 24	2462	+ 8 30	−0 14	2558	+ 18 47	−0 30
	561	+ 10 31	−0 18	581	+ 23 3	−0 22	2487	+ 3 31	−0 41	2480	+ 2 9	−0 16	2649	+ 16 49	−0 28
	577	+ 20 17	−0 17	598	− 2 36	−0 36	2491	+ 3 36	−0 23	2487	+ 3 31	−0 42	2664	+ 16 45	−0 26
	598	− 2 36	−0 19	609	+ 11 46	−0 26	2526	+ 5 29	−0 35	2491	+ 3 36	−0 25	2679	+ 10 15	−0 31
	633	− 0 24	−0 31	641	+ 7 13	−0 28	2558	+ 18 47	−0 29	2526	+ 5 29	−0 25	2690	+ 13 26	−0 19
	641	+ 7 13	−0 32	741	+ 9 14	−0 23	2612	+ 2 3	−0 27	2558	+ 18 47	−0 31	2725	− 2 40	−0 19
				750	+ 10 11	−0 28	2649	+ 16 49	−0 22	2649	+ 16 49	−0 28	2744	+ 17 59	−0 13
				766	+ 24 47	−0 24	2664	+ 16 45	−0 26	2664	+ 16 45	−0 27	2759	+ 18 0	−0 33
							2679	+ 10 15	−0 22	2679	+ 10 15	−0 30	2778	+ 9 31	−0 10
							2690	+ 13 26	−0 30	2690	+ 13 26	−0 22	2782	+ 9 12	−0 30
							2725	− 2 40	−0 24	2725	− 2 40	−0 19			
							2759	+ 18 0	−0 39						
	Mean $(B_S - C_S)$		−0 208			−0 270			−0 276			−0 247			−0 243

Observed with Telescope No 1

Between Captain Burrard and Lieutenant Lenox-Conyngham.

At DEHRA DŪN (Latitude 30° 19')

By Stars of	Observed with Telescope No 2.						Observed with Telescope No. 1		
	April 2, 1892			April 3, 1892			April 4, 1892		
	Star	Declination	Equation (B − C)	Star	Declination	Equation (B − C)	Star	Declination	Equation (B − C)
		° '	s		° '	s		° '	s
North Aspect	3728	+ 34 48	−0 17	3728	+ 34 48	−0 14	3728	+ 34 48	−0 20
	3741	+ 34 5	−0 29	3741	+ 34 5	−0 28	3757	+ 41 0	−0 24
	3757	+ 41 0	−0 16	3757	+ 41 0	−0 16	3784	+ 38 49	−0 38
	3784	+ 38 49	−0 17	3851	+ 32 9	−0 12	3851	+ 32 9	−0 18
	3851	+ 32 9	−0 22	3905	+ 39 56	−0 36	3868	+ 44 5	−0 30
	3905	+ 39 56	−0 19	3952	+ 44 13	−0 20	3905	+ 39 56	−0 32
	3952	+ 44 13	−0 32	3973	+ 42 19	−0 32	3952	+ 44 13	−0 29
	3978	+ 42 19	−0 27	3981	+ 48 23	−0 21	3973	+ 42 19	−0 31
	3981	+ 48 23	−0 35	3998	+ 35 32	−0 23	3981	+ 48 23	−0 25
	3998	+ 35 32	−0 22	4010	+ 38 34	−0 40	3998	+ 35 32	−0 22
	4010	+ 38 34	−0 45	4028	+ 47 4	−0 19	4010	+ 38 34	−0 27
	4028	+ 47 4	−0 25						
	Mean ($B_N - C_N$)		−0 255			−0 237			−0 269
South Aspect	3671	+ 23 45	−0 17	3708	+ 11 7	−0 29	3684	+ 3 3	−0 21
	3696	+ 6 55	−0 36	3776	+ 20 46	−0 32	3696	+ 6 55	−0 25
	3708	+ 11 7	−0 25	3795	+ 2 28	−0 26	3708	+ 11 7	−0 28
	3720	+ 4 10	−0 33	3824	+ 14 59	−0 31	3769	+ 6 41	−0 28
	3776	+ 20 46	−0 36	3861	+ 5 28	−0 29	3776	+ 20 46	−0 27
	3795	+ 2 28	−0 30	3877	+ 11 8	−0 24	3795	+ 2 28	−0 27
	3808	+ 17 48	−0 31	3919	+ 14 58	−0 18	3808	+ 17 48	−0 27
	3824	+ 14 59	−0 35	3930	+ 3 40	−0 40	3824	+ 14 59	−0 31
	3831	+ 20 43	−0 26	3990	+ 20 49	−0 32	3831	+ 20 43	−0 40
	3861	+ 5 28	−0 22	4039	+ 4 5	−0 35	3842	+ 23 41	−0 24
	3877	+ 11 8	−0 24	4049	+ 4 15	−0 29	3877	+ 11 8	−0 28
	3919	+ 14 58	−0 32				3919	+ 14 58	−0 23
	3930	+ 3 40	−0 25				3930	+ 3 40	−0 31
							3937	+ 28 23	−0 27
	Mean ($B_S - C_S$)		−0 286			−0 295			−0 276

Between Captain Burrard and Lieutenant Lenox-Conyngham

Station	By Stars of North Aspect				By Stars of South Aspect	
	Astronomical Date	Telescope in use	Mean Value of Equation $(B_N - C_N)$	General Mean $(B_N - C_N)$	Mean Value of Equation $(B_S - C_S)$	General Mean $(B_S - C_S)$
KARACHI	1891		s	s	s	s
	November 9	No 1	− 0 154	− 0 180	− 0 208	− 0 239
	„ 10	„ 1	− 0 205		− 0 270	
BOMBAY	1892					
	February 17	No 1	− 0 286		− 0 276	
	„ 18	„ 1	− 0 238	− 0 253	− 0 247	− 0 255
	„ 19	„ 1	− 0 234		− 0 243	
DEHRA DÚN	April 2	No 2	− 0 255		− 0 286	
	„ 3	„ 2	− 0 237	− 0 254	− 0 295	− 0 286
	4	„ 1	− 0 269		− 0 276	

Final Values of the Equation Adopted

The difference between the final means $(B_N - C_N)$ and $(B_S - C_S)$ is so small that a mean of the two has been adopted as applicable to all stars

For the first Arc of the season, *viz*, Calcutta-Waltair, the following value was adopted, $(B - C) = - 0^s 210$, being the November value

For the second and third Arcs, *viz*, Waltair-Jubbulpore and Waltair-Madras the following value was adopted, $(B - C) = - 0^s 254$, being the February value

For the fourth and fifth Arcs, *viz*, Waltair-Bolarum and Bolarum-Bombay the following value was adopted, $(B - C) = - 0^s 262$, being the mean of the February and April values

For the sixth Arc, *viz*, Fyzabad Dehra Dún, the April value $(B - C) = - 0^s 270$ was adopted

In these equations the general symbol (B − C) signifies the quantity which must be *added* to times observed by Lieutenant Lenox-Conyngham, before they are compared with those observed by Captain Burrard

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

CALCUTTA (E) *Lat 22 33 Long 5h 53m 36s* AND WALTAIR (W) *Lat 17° 43' Long 5h 33m 26s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $C_N - B_N = + 0^s 210$, $C_S - B_S = + 0 210$	$\Delta L - \rho$
1891					h m s	s	s			h m s	s	s	m s				
Dec 6	1408	+ 28 44	N	*I P E*	4 27 52 65	+2 14	54 79	N	*I P E*	4 48 3 87	−0 04	3 83	20 9 04	m s 20 8 945	− 0 060	+ 0 210	20 9 095
	1414	+ 41 3	N	d c + 2 5 b + 5 6 a + 0 3 s Q + 1 94	29 12 74	+2 17	14 91	N	d c − 5 1 b − 15 6 a +237 6 s Q + 1 64	49 25 50	−1 74	23 76	8 85				
	1384	+ 12 49	S		4 22 47 29	+2 13	49 42	S		4 42 56 85	+1 64	58 49	20 9 07	m s 20 9 003	− 0 060	+ 0 210	20 9 153
	1391	+ 15 58	S		24 22 94	+2 13	25 07	S		44 32 66	+1 33	33 99	8 92				
	1402	+ 15 37	S		25 41 80	+2 13	43 93	S		45 51 58	+1 37	52 95	9 02				
	1449	+ 22 45	N	s Q − 1 94	4 35 49 67	−1 74	47 93	N	s Q + 1 64	4 55 56 55	+0 64	57 19	20 9 26	m s 20 9 123	− 0 060	+ 0 210	20 9 23
	1462	+ 28 28	N		39 8 07	−1 74	6 33	N		59 15 46	0 00	15 46	9 13				
	1475	+ 32 24	N		42 23 89	−1 72	22 17	N		5 2 31 70	−0 49	31 21	9 04				
	1492	+ 36 31	N		45 28 27	−1 72	26 55	N		5 36 66	−1 05	35 61	9 06				
	1435	− 2 41	S		4 32 14 23	−1 77	12 46	S		4 52 18 43	+3 05	21 48	20 9 02	m s 20 8 980	− 0 060	+ 0 210	20 9 130
	1442	+ 11 59	S		34 6 75	−1 75	5 00	S		54 12 30	+1 71	14 01	9 01				
	1469	− 3 27	S		40 10 50	−1 77	8 73	S		5 0 14 54	+3 12	17 66	8 93				
	1485	+ 15 43	S		43 37 60	−1 75	35 85	S		3 43 46	+1 35	44 81	8 96				
Dec 7	1362	+ 22 3	N	*I P W*	4 19 2 56	−0 11	s 2 45	N	*I P E*	4 39 13 98	−2 47	11 51	20 9 06	m s 20 8 957	− 0 059	+ 0 210	20 9 108
	1371	+ 22 45	N	d c − 4 1 b 0 0 a −48 2 s Q 0 00	20 56 68	−0 10	56 58	N	d c − 5 1 b − 8 9 a +2,8 5 s Q − 1 64	41 8 04	−2 56	5 48	8 90				
	1408	+ 28 44	N		27 59 15	+0 03	59 18	N		48 11 44	−3 35	8 09	8 91				
	1360	+ 16 32	S		4 17 19 97	−0 22	19 75	S		4 37 30 63	−1 83	28 80	20 9 05	m s 20 8 975	− 0 059	+ 0 210	20 9 126
	1384	+ 12 49	S		22 53 98	−0 28	53 70	S		43 4 08	−1 40	2 68	8 98				
	1391	+ 15 58	S		24 29 50	−0 23	29 27	S		44 40 01	−1 78	38 23	8 96				
	1402	+ 15 37	S		25 48 52	−0 23	48 29	S		45 58 92	−1 72	57 20	8 91				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$.

CALCUTTA (E) *Lat 22° 33′, Long 5h 53m 36s*; AND WALTAIR (W) *Lat 17° 43′, Long 5h 33m 26s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl. Equations $C_N - B_N = + 0^s 210$, $C_S - B_S = + 0 210$	$\Delta L - \rho$
1891		° ′			h m s	s	s			h m s	s	s	m s	m s			
Dec 7	1449	+ 22 45	N	*I P W*	4 35 52 43	−0 10	52 33	N	*I P E*	4 56 4 01	−2 56	1 45	20 9 12	20 9 115	− 0 059	+ 0 210	20 9 266
	1462	+ 28 28	N	d: c − 4 1	39 10 55	+0 03	10 58	N	d: c − 5 1	59 23 02	−3 30	19 72	9 14				
	1475	+ 32 24	N	b 0 0; *a* −48 2	42 26 28	+0 11	26 39	N	b − 8 9; *a* +278 5	5 2 39 39	−3 88	35 51	9 12				
	1492	+ 36 31	N	Q 0s 00	45 30 60	+0 21	30 81	N	Q − 1s 64	5 44 41	−4 52	39 89	9 08				
	1435	− 2 41	S		4 32 17 25	−0 55	16 70	S		4 52 25 51	+0 23	25 74	20 9 04	20 9 053	− 0 059	+ 0 210	20 9 204
	1442	+ 11 59	S		34 9 54	−0 29	9 25	S		54 19 56	−1 32	18 24	8 99				
	1469	− 3 27	S		40 13 38	−0 56	12 82	S		5 0 21 64	+0 31	21 95	9 13				
	1485	+ 15 43	S		43 40 24	−0 23	40 01	S		3 50 81	−1 75	49 06	9 05				
Dec 8	1414	+ 41 3	N	*I P W*	4 29 23 22	+0 24	23 46	N	*I P W*	4 49 33 22	−1 05	32 17	20 8 71	20 8 710	− 0 057	+ 0 210	20 8 863
				d: c − 4 1; b − 1 0; *a* −41 2					d: α + 3 3; b + 2 9; *a* +240 4								
				Q 0s 00					Q + 1s 61								
	1384	+ 12 49	S		4 22 58 19	−0 27	57 92	S		4 43 4 64	+2 24	6 88	20 8 96	20 8 940	− 0 057	+ 0 210	20 9 093
	1391	+ 15 58	S		24 33 76	−0 23	33 53	S		44 40 52	+1 93	42 45	8 92				
	1440	+ 22 45	N	Q 0s 00	4 35 56 61	−0 12	56 49	N	Q + 1s 61	4 56 4 16	+1 26	5 42	20 8 93	20 8 980	− 0 057	+ 0 210	20 9 133
	1492	+ 36 31	N		45 34 81	+0 14	34 95	N		5 5 44 36	−0 38	43 98	9 03				
	1435	− 2 41	S		4 32 21 34	−0 50	20 84	S		4 52 26 27	+3 62	29 89	20 9 05	20 9 025	− 0 057	+ 0 210	20 9 178
	1469	− 3 27	S		40 17 53	−0 51	17 02	S		5 0 22 33	+3 69	26 02	9 00				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho_{\prime}$

CALCUTTA (E) *Lat 22° 33′, Long 5h 53m 36s*: AND WALTAIR (W) *Lat 17° 43′, Long 5h 33m 26s*

Astronomical Date	Star		Transits Observed at E — *By Lenox-Conyngham, with Telescope No 2*					Transits Observed at W — *By Burrard, with Telescope No 1*					Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns. for Persl. Equations $C_E - B_W = +0.210$; $C_W - B_E = +0.210$	$\Delta L - \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1891					h m s	s	s			h m s	s	s	m s				
Dec 10	1362	+ 22 3	N	*I P E*	4 19 14 59	+0 08	14 67	N	*I P W*	4 39 22 48	+1 10	23 58	20 8 91	m s 20 8 875	− 0 050	+ 0 210	20 9 035
	1371	+ 22 45	N	d c + 2 5	21 8 58	+0 09	8 67	N	d c − 1 7	41 16 59	+1 01	17 60	8 93				
	1408	+ 28 44	N	b + 1 1 a −47 0	28 11 06	+0 22	11 28	N	b + 0 5 a +280 4	48 19 85	+0 23	20 08	8 80				
	1414	+ 41 3	N	s Q 0 00	29 30 73	+0 54	31 27	N	s Q + 1 63	49 41 85	−1 72	40 13	8 86				
	1350	+ 16 32	S		4 17 32 00	−0 03	31 97	S		4 37 38 98	+1 74	40 72	20 8 75	m s 20 8 795	− 0 050	+ 0 210	20 8 955
	1384	+ 12 49	S		23 6 04	−0 10	5 94	S		43 12 62	+2 16	14 78	8 84				
	1391	+ 15 58	S		24 41 52	−0 04	41 48	S		44 48 51	+1 80	50 31	8 83				
	1402	+ 15 37	S		26 0 51	−0 04	0 47	S		46 7 38	+1 85	9 23	8 76				
	1449	+ 22 45	N	s Q 0 00	4 36 4 41	+0 09	4 50	N	s Q + 1 03	4 56 12 48	+1 01	13 49	20 8 99	m s 20 8 928	− 0 050	+ 0 210	20 9 088
	1462	+ 28 28	N		39 22 69	+0 21	22 90	N		59 31 48	+0 28	31 76	8 86				
	1475	+ 32 24	N		42 38 29	+0 31	38 60	N		5 2 47 80	−0 29	47 51	8 91				
	1492	+ 36 31	N		45 42 56	+0 41	42 97	N		5 52 85	−0 93	51 92	8 95				
	1435	− 2 41	S		4 32 29 22	−0 37	28 85	S		4 52 33 88	+3 80	37 68	20 8 83	m s 20 8 855	− 0 050	+ 0 210	20 9 015
	1442	+ 11 59	S		34 21 48	−0 12	21 36	S		54 27 99	+2 24	30 23	8 87				
	1469	− 3 27	S		40 25 49	−0 38	25 11	S		5 0 30 08	+3 87	33 95	8 84				
	1485	+ 15 43	S		43 52 18	−0 04	52 14	S		3 59 20	+1 82	61 02	8 88				
Dec 11	1695	+ 21 51	N	*I P W*	5 21 29 53	+1 51	31 04	N	*I P E*	5 41 38 80	+1 35	40 15	20 9 11	m s 20 9 183	− 0 045	+ 0 210	20 9 348
	1709	+ 29 6	N	d c − 4 1	23 9 43	+1 63	11 06	N	d c − 5 1	43 18 90	+1 31	20 21	9 15				
	1728	+ 32 7	N	b − 2 1 a −36 7	26 2 24	+1 67	3 91	N	b − 4 8 a + 9 1	46 11 90	+1 30	13 20	9 29				
				s Q + 1 67					s Q + 1 61								
	1657	− 0 31	S		5 16 22 15	+1 22	23 37	S		5 36 30 88	+1 46	32 34	20 8 97	m s 20 8 995	− 0 045	+ 0 210	20 9 160
	1671	+ 17 17	S		18 28 04	+1 44	29 48	S		38 37 12	+1 38	38 50	9 02				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL — ρ

CALCUTTA (E) *Lat* 22° 33′, *Long* 5h 53m 36s : AND WALTAIR (W) *Lat* 17° 43′ *Long* 5h 33m 26s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $C_W - B_W = +0\ 210$, $C_B - B_B = +0\ 210$	ΔL − ρ
1891					h m s	s	s			h m s	s	s	m s				
Dec 11	1742	+ 23 58	N	*I P W*	5 29 15 47	− 1 80	13 6,	N	*I P E*	5 49 21 27	+ 1 35	22 62	20 8 95				
	17,4	+ 26 52	N	d c − 4 1	30 48 16	− 1 75	46 41	N	d c − 5 1	50 54 10	+ 1 32	55 42	9 01	m s 20 8 983	− 0 045	+ 0 210	20 9 148
	1768	+ 30 26	N	b − 2 1 a − 36 7	32 5 91	− 1 70	4 21	N	b − 4 8 a + 9 1	52 12 00	+ 1 31	13 31	9 10				
	1778	+ 25 50	N	Q − 1 67 s	33 26 61	− 1 67	24 94	N	Q + 1 61 s	53 32 48	+ 1 33	33 81	8 87				
	1789	− 3 37	S		6 34 32 84	− 2 16	30 68	S		5 54 38 08	+ 1 47	39 55	20 8 87				
	1806	+ 1 25	S		37 17 96	− 2 10	15 86	S		57 23 23	+ 1 46	24 69	8 83	m s 20 8 963	− 0 045	+ 0 210	20 9 128
	1810	+ 16 3	S		39 4 04	− 1 92	2 12	S		59 9 83	+ 1 3)	11 22	9 10				
	1821	+ 15 47	S		40 56 94	− 1 92	55 02	S		6 1 2 68	+ 1 39	4 07	9 05				
Dec 12	1362	+ 22 3	N	*I P W*	4 19 19 66	+ 1 47	21 13	N	*I P W*	4 39 28 58	+ 1 43	30 01	20 8 88				
	1371	+ 22 45	N	d c − 4 1	20 13 73	+ 1 48	15 31	N	d c − 1 7	40 22 54	+ 1 45	23 99	8 ,8	m s 20 8 ,90	− 0 045	+ 0 210	20 8 955
	1408	+ 28 44	N	b − 4 1 a − 39 4	28 16 13	+ 1 59	17 72	N	b − 8 2 a − 36 1	48 24 98	+ 1 54	26 52	8 80				
	1414	+ 41 3	N	Q + 1 68 s	29 35 97	+ 1 81	37 78	N	Q + 1 61 s	49 44 71	+ 1 ,7	46 48	8 70				
	1360	+ 16 32	S		4 17 37 06	+ 1 38	38 44	S		4 37 45 93	+ 1 36	4, 29	20 8 85				
	1384	+ 12 49	S		23 11 07	+ 1 35	12 42	S		43 19 88	+ 1 31	21 19	8 77	m s 20 8 808	− 0 045	+ 0 210	20 8 973
	1391	+ 15 58	S		24 46 45	+ 1 38	47 83	S		44 55 39	+ 1 35	56 ,4	8 91				
	1402	+ 15 37	S		26 5 38	+ 1 38	6 96	S		46 14 31	+ 1 35	15 66	8 70				
	1440	+ 22 45	N	Q − 1 68 s	4 36 12 80	− 1 88	10 92	N	Q − 1 61 s	4 56 21 67	− 1 77	19 90	20 8 98				
	1462	+ 28 28	N		39 31 21	− 1 78	29 43	N		59 39 87	− 1 68	38 19	8 ,6	m s 20 8 875	− 0 045	+ 0 210	20 9 040
	1475	+ 32 24	N		42 46 92	− 1 72	45 20	N		5 2 53 60	+ 0 3,	53 97	8 77				
	1493	+ 36 31	N		45 51 00	− 1 64	49 36	N		5 59 91	− 1 56	58 35	8 99				
	1442	+ 11 59	S		4 34 29 90	− 2 03	27 87	S		4 54 38 64	− 1 92	36 72	20 8 85				
	1469	− 3 27	S		40 33 70	− 2 24	31 46	S		5 0 42 48	− 2 11	40 37	8 91	m s 20 8 903	− 0 045	+ 0 210	20 9 068
	1485	+ 15 43	S		43 60 58	− 1 98	58 60	S		4 9 42	− 1 87	7 55	8 95				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

CALCUTTA (E) *Lat* 22° 33′, *Long* 5h 53m 36s AND WALTAIR (W) *Lat* 17° 43′, *Long* 5h 33m 26s

Astronomical Date	Star		Transits Observed at E — By *Lenox Conyngham with Telescope No 2*					Transits Observed at W — By *Burrard with Telescope No 1*					Difference of Corrected Times (W − E)		Correction for Rate of W Clock	Corrns. for Persl Equations $C_N - B_N = +0^s\ 210$, $C_S - B_S = +0\ 210$	$\Delta L + \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1891					h m s	s	s			h m s	s	s	m s				
Dec 6	1695	+ 21 51	N	*I P E*	5 0 18 99	+2 13	21 12	N	*I P E*	5 20 32 78	−2 53	30 25	20 9 13	m s 20 9 133	+ 0 011	+ 0 210	20 9 354
	1714	+ 22 23	N	d c + 2 5	3 22 26	+2 14	24 40	N	d c − 5 1	23 36 11	−2 62	33 49	9 09				
	1723	+ 32 7	N	b + 5 6 a + 0 3	4 51 95	+2 16	54 11	N	b − 15 6 a + 237 6	25 7 03	−3 74	3 29	9 18				
				s Q + 1 94					s Q − 1 64								
	1657	− 0 31	S		4 55 11 25	+2 12	13 37	S		5 15 23 07	−0 42	22 65	20 9 28	m s 20 9 233	+ 0 011	+ 0 210	20 9 454
	1660	− 0 29	S		55 25 07	+2 12	27 19	S		15 36 87	−0 42	36 45	9 26				
	1671	+ 17 17	S		57 17 36	+2 13	19 49	S		17 30 76	−2 08	28 68	9 19				
	1680	+ 1 45	S		58 18 65	+2 12	20 77	S		18 30 59	−0 62	29 97	9 20				
	1742	+ 23 58	N	s Q − 1 94	5 8 5 32	−1 74	3 58	N	s Q − 1 64	5 28 15 45	−2 78	12 67	20 9 09	m s 20 9 203	+ 0 011	+ 0 210	20 9 424
	1751	+ 26 52	N		9 38 02	−1 74	36 28	N		29 48 64	−3 11	45 53	9 25				
	1768	+ 30 26	N		10 55 87	−1 74	54 13	N		31 6 91	−3 51	3 40	9 27				
	1810	+ 16 3	S		5 17 54 01	−1 75	52 26	S		5 38 3 24	−1 95	1 29	20 9 03	m s 20 9 010	+ 0 011	+ 0 210	20 9 231
	1821	+ 15 47	S		20 46 95	−1 75	45 20	S		40 56 12	−1 93	54 19	8 99				
Dec 7	1709	+ 29 6	N	*I P W*	5 2 0 29	+0 04	0 33	N	*I P E*	5 22 9 72	−0 10	9 62	20 9 29	m s 20 9 230	+ 0 011	+ 0 210	20 9 451
	1714	+ 22 23	N	d c − 4 1	3 23 72	−0 10	23 62	N	d c − 5 1	23 32 06	+0 75	32 81	9 19				
	1723	+ 32 7	N	b 0 0 a − 48 2	4 53 24	+0 10	53 34	N	b − 8 9 a + 278 5	25 3 11	−0 56	2 55	9 21				
				s Q 0 00					s Q + 1 64								

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

CALCUTTA (E) *Lat* 22° 38′ *Long* 5h 53m 86 : AND WALTAIR (W) *Lat* 17° 43′, *Long* 5h 33m 26s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $C_W - B_W = +0^s 210$, $C_E - B_E = +0\ 210$	$\Delta L + \rho$
1891					h m s	s	s			h m s	s	s	m s				
Dec 7	1754	+ 26 52	N	*I P W*	5 9 35 65	−0 01	35 64	N	*I P E*	5 29 44 62	+0 18	44 80	20 9 16	m s 20 9 193	+ 0 011	+ 0 210	20 9 414
	1768	+ 30 26	N	d c − 4 1	10 53 38	+0 06	53 44	N	d c − 5 1	31 2 97	−0 31	2 66	9 22				
	1778	+ 25 50	N	b 0 0 a −48 2	12 14 07	−0 03	14 04	N	b − 8 9 a +278 5	32 22 92	+0 32	23 24	9 20				
				Q s 0 00					Q + s 1 64								
	1780	− 3 37	S		5 13 20 40	−0 57	19 83	S		5 33 25 43	+3 62	29 05	20 9 22	m s 20 9 210	+ 0 011	+ 0 210	20 9 431
	1806	+ 1 25	S		16 5 42	−0 48	4 94	S		36 11 11	+3 09	14 20	9 26				
	1810	+ 16 3	S		17 51 62	−0 23	51 39	S		37 59 03	+1 50	60 53	9 14				
	1821	+ 15 47	S		19 44 46	−0 23	44 23	S		39 51 92	+1 53	53 45	9 22				
Dec 8	1695	+ 21 51	N	*I P W*	5 0 19 83	−0 13	19 70	N	*I P W*	5 20 30 65	−1 88	28 77	20 9 07	m s 20 9 140	+ 0 011	+ 0 210	20 9 361
	1709	+ 29 6	N	d c − 4 1	1 59 72	−0 01	59 71	N	d c + 3 3	22 11 45	−2 67	8 78	9 07				
	1714	+ 22 23	N	b − 1 0 a −41 2	3 22 87	−0 12	22 75	N	b + 2 9 a + 240 4	23 33 98	−1 95	32 03	9 28				
				Q s 0 00					Q − s 1 62								
	1657	− 0 31	S		4 55 12 49	−0 47	12 02	S		5 15 20 90	+0 19	21 09	20 9 07	m s 20 9 140	+ 0 011	+ 0 210	20 9 361
	1660	− 0 29	S		55 26 17	−0 47	25 70	S		15 34 67	+0 19	34 86	9 16				
	1671	+ 17 17	S		57 18 27	−0 21	18 06	S		17 28 55	−1 42	27 13	9 07				
	1685	+ 1 45	S		58 19 63	−0 44	19 19	S		18 28 45	0 00	28 45	9 26				
Dec 10	1695	+ 21 51	N	*I P E*	5 0 17 94	+0 08	18 02	N	*I P W*	5 20 29 23	−2 14	27 09	20 9 07	m s 20 9 060	+ 0 012	+ 0 210	20 9 282
	1723	+ 32 7	N	d c + 2 5	4 50 72	+0 31	51 03	N	d c − 1 7	25 3 59	−3 51	0 08	9 05				
				b + 1 1 a −47 0					b + 0 5 a + 280 4								
				Q s 0 00					Q − s 1 63								

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

CALCUTTA (E) *Lat 22° 33′ Long 5h 53m 36s*: AND WALTAIR (W) *Lat 17 43′, Long 5h 33m 26s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham, with Telescope No 2): Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By Burrard, with Telescope No 1): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Difference of Corrected Times (W − E): Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $C_E - B_W = + 0\ 210$, $C_S - B_S = + 0\ 210$	$\Delta L + \rho$
1891					h m s	s	s			h m s	s	s	m s				
Dec 10	1657	− 0 31	S	*I P E*	4 55 10 70	−0 33	10 37	S	*I P W*	5 15 19 05	+0 30	19 35	20 8 98	m s 20 9 008	+ 0 012	+ 0 210	20 9 230
	1660	− 0 29	S	d c + 2 5	55 24 45	−0 33	24 12	S	d c − 1 7	15 3 89	+0 30	33 19	9 07				
	1671	+ 17 17	S	b + 1 1 a −47 0	5, 16 50	−0 01	16 49	S	b + 0 5 a +280 4	17 27 00	−1 60	25 40	8 91				
	1685	+ 1 45	S	s Q 0 00	58 17 95	−0 30	17 65	S	s Q − 1 63	18 26 64	+0 08	26 72	9 07				
	1742	+ 23 58	N	s Q 0 00	5 8 0 36	+0 12	0 48	N	s Q− 1 63	5 28 11 96	−2 42	9 54	20 9 06	m s 20 9 020	+ 0 012	+ 0 210	20 9 242
	1754	+ 26 52	N		9 33 12	+0 18	33 30	N		29 45 05	−2 78	42 27	8 97				
	1768	+ 30 26	N		10 50 87	+0 25	51 12	N		31 3 45	−3 26	0 19	9 07				
	1778	+ 5 50	N		12 11 62	+0 16	11 78	N		32 23 40	−2 64	20 76	8 98				
	1789	− 3 37	S		5 13 17 97	−0 39	17 58	S		5 33 25 90	+0 64	26 54	20 8 96	m s 20 8 898	+ 0 012	+ 0 210	20 9 120
	1806	+ 1 25	S		16 2 99	−0 30	2 69	S		36 11 52	+0 11	11 63	8 94				
	1810	+ 16 3	S		17 49 22	−0 03	49 19	S		37 59 49	−1 46	58 03	8 84				
	1821	+ 15 47	S		19 42 05	−0 04	42 01	S		39 52 30	−1 44	50 86	8 85				
Dec 11	2047	+ 22 34	N	*I P W*	5 55 32 19	+1 52	33 71	N	*I P E*	6 15 44 93	−1 88	43 05	20 9 .4	m s 20 9 295	+ 0 012	+ 0 210	20 9 517
	2067	+ 21 42	N	d c − 4 1 b − 2 1 a −36 7 s Q + 1 67	58 20 51	+1 51	22 02	N	d c − 5 1 b − 4 8 a + 9 1 s Q− 1 62	18 33 15	−1 88	31 27	9 25				
	2057	+ 3 49	S		5 56 44 01	+1 28	45 29	S		6 16 56 25	−1 78	54 47	20 9 18	m s 20 9 140	+ 0 012	+ 0 210	20 9 362
	2086	+ 0 22	S		6 0 48 06	+1 23	49 29	S		20 60 16	−1 77	58 39	9 10				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

CALCUTTA (F) *Lat 22° 33 Long 5h 53m 33* AND WALTAIR (W) *Lat 17° 43′ Long 5h 33m 26s*

Astronomical Date	Star		Transits Observed at E — *By Lenox Conyngham with Telescope No 2*					Transits Observed at W — *By Burrard with Telescope No 1*					Difference of Corrected Times (W − E)		Correction for Rate of W Clock	Corrns for Persl Equations $C_N - B_N = + 0^s 210$, $C_S - B_S = + 0 210$	$\Delta L + \rho$
	BAC Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
					h m s	s	s			h m s	s	s	m s	m s			
1891 Dec 11	2110	+ 32 32	N	*I P W* d c − 4 1 b − 2 1 a − 36 7 s Q − 1 67	6 4 34 20	− 1 66	32 54	N	*I P E* d c − 5 1 b − 4 8 a + 9 1 s Q − 1 62	6 24 43 76	− 1 94	41 82	20 9 28	20 9 213	+ 0 012	+ 0 210	20 9 435
	2155	+ 39 29	N		10 20 30	− 1 54	18 76	N		30 29 03	− 1 00	28 03	9 27				
	2170	+ 28 22	N		11 54 55	− 1 72	52 83	N		32 3 83	− 1 91	1 92	9 09				
	2123	+ 4 56	S		6 5 45 56	− 2 05	43 51	S		6 25 54 26	− 1 79	52 47	20 8 96	20 9 068	+ 0 012	+ 0 210	20 9 290
	2140	+ 16 17	S		7 50 24	− 1 91	48 33	S		27 59 36	− 1 84	57 52	9 19				
	2191	+ 17 45	S		15 17 15	− 1 89	15 26	S		35 24 53	− 0 23*	24 30	9 04				
	2199	+ 13 20	S		17 4 06	− 1 95	2 11	S		37 13 01	− 1 83	11 19	9 08				
Dec 12	1695	+ 21 51	N	*I P W* d c − 4 1 b − 4 1 a − 39 4 s Q + 1 68	5 0 14 80	+ 1 47	16 27	N	*I P W* d c − 1 7 b − 8 2 a − 36 1 s Q + 1 61	5 20 23 83	+ 1 43	25 26	20 8 99	20 9 003	+ 0 012	+ 0 210	20 9 225
	1709	+ 29 6	N		1 54 75	+ 1 59	56 34	N		22 3 73	+ 1 54	5 27	8 93				
	1714	+ 22 23	N		3 18 01	+ 1 48	19 49	N		23 27 15	+ 1 44	28 59	9 10				
	1728	+ 32 7	N		4 47 65	+ 1 63	49 28	N		24 56 67	+ 1 60	58 7	8 99				
	1742	+ 23 58	N	s Q − 1 68	5 7 60 48	− 1 86	58 62	N	s Q − 1 61	5 28 9 50	− 1 75	7 75	20 9 13	20 9 08	+ 0 012	+ 0 210	20 9 300
	1754	+ 26 52	N		9 33 25	− 1 80	31 45	N		29 42 27	− 1 71	40 56	9 11				
	1768	+ 30 26	N		10 51 20	− 1 76	49 44	N		30 60 03	− 1 65	58 38	8 94				
	1778	+ 25 50	N		12 11 75	− 1 82	9 93	N		32 20 78	− 1 72	19 06	9 13				
	1789	− 3 37	S		5 13 18 06	− 2 24	15 82	S		5 33 26 93	− 2 12	24 81	20 8 99	20 9 043	+ 0 012	+ 0 210	20 9 255
	1810	+ 16 3	S		17 49 29	− 1 98	47 31	S		37 58 20	− 1 87	56 33	9 02				
	1821	+ 15 47	S		19 42 09	− 1 98	40 11	S		39 51 07	− 1 87	49 20	9 09				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in this case Q = o oo.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

WALTAIR (E) *Lat 17° 43′ Long 5h 33m 26s* AND JUBBULPORE (W) *Lat 23° 10′, Long 5h 19m 58s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Persl. Equations $B_E - C_W = - 0^s 254$, $B_E - C_E = - 0 254$	$\Delta L - \rho$
1891		′			h m s	s	s			h m s	s	s	m s				
Dec 18	1602	+ 38 22	N	*I P W*	5 5 44 92	+ 1 21	46 13	N	*I P E*	5 19 14 01	+ 0 48	14 49	13 28 36	m s 13 28 565	− 0 044	− 0 254	13 28 267
	1620	+ 22 10	N	d c − 6 5	8 40 56	+ 1 35	41 91	N	d c + 7 2	22 10 20	+ 0 31	10 51	28 60				
	1627	+ 33 16	N	b − 3 0 a + 12 0	10 47 93	+ 1 26	49 19	N	b + 6 2 a − 12 8	24 17 47	+ 0 41	17 88	28 69				
	1637	+ 21 59	N	s Q + 1 60	12 29 74	+ 1 35	31 09	N	s Q 0 00	25 59 39	+ 0 31	59 70	28 61				
	1651	+ 19 42	S		5 14 16 18	+ 1 37	17 55	S		5 27 45 93	+ 0 30	46 23	13 28 68	m s 13 28 733	− 0 044	− 0 254	13 28 435
	1657	− 0 31	S		15 43 45	+ 1 4	44 92	S		29 13 55	+ 0 17	13 72	28 80				
	1660	− 0 29	S		15 57 26	+ 1 47	58 73	S		29 27 28	+ 0 17	27 45	28 72				
	1709	+ 29 6	N	s Q − 1 60	5 22 34 67	− 1 91	32 76	N	s Q 0 00	5 36 1 04	+ 0 37	1 41	13 28 65	m s 13 28 680	− 0 044	− 0 254	13 28 382
	1723	+ 32 7	N		25 27 61	− 1 93	25 68	N	,	38 53 94	+ 0 40	54 34	28 66				
	1742	+ 23 58	N		28 37 04	− 1 86	35 18	N		42 3 54	+ 0 33	3 87	28 69				
	1754	+ 26 52	N		30 9 87	− 1 88	7 99	N		43 36 35	+ 0 36	36 71	28 72				
	1685	+ 1 45	S		5 18 53 98	− 1 74	52 24	S		5 32 20 80	+ 0 19	20 99	13 28 75	m s 13 28 713	− 0 044	− 0 254	13 28 415
	1695	+ 21 51	S		20 54 43	− 1 85	52 58	S		34 21 02	+ 0 31	21 33	28 75				
	1787	+ 14 14	S		27 31 64	− 1 80	29 84	S		40 58 22	+ 0 26	58 48	28 64				
Dec 19	1602	+ 38 22	N	*I P E*	5 5 49 75	+ 1 02	s 50 77	N	*I P E*	5 19 18 80	+ 0 54	19 34	13 28 57	m s 13 28 540	− 0 044	− 0 254	13 28 242
	1620	+ 22 10	N	d c − 5 3	8 45 21	+ 1 37	46 58	N	d c + 7 2	22 14 77	+ 0 35	15 12	28 54				
	1627	+ 33 16	N	b − 1 3 a + 40 4	10 52 71	+ 1 15	53 86	N	b + 7 7 a − 15 5	24 21 93	+ 0 46	22 39	28 53				
	1637	+ 21 59	N	s Q + 1 61	12 34 36	+ 1 38	35 74	N	s Q 0 00	26 3 91	+ 0 35	4 26	28 52				
	1591	+ 15 28	S		5 3 17 98	+ 1 50	19 48	S		5 16 47 73	+ 0 30	48 03	13 28 55	m s 13 28 555	− 0 044	− 0 254	13 28 257
	1651	+ 19 42	S		14 20 85	+ 1 42	22 27	S		27 50 44	+ 0 33	50 77	28 50				
	1657	− 0 31	S		15 47 92	+ 1 74	49 66	S		29 18 07	+ 0 18	18 25	28 59				
	1660	− 0 29	S		16 1 76	+ 1 74	3 50	S		29 31 90	+ 0 18	32 08	28 58				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

WALTAIR (E) *Lat 17° 48′ Long 5h 33m 26s* AND JUBBULPORE (W) *Lat 23° 10′ Long 5h 19m 58s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $B_N - C_N = -0^s.254$, $B_S - C_S = -0.254$	$\Delta L - \rho$
1891					h m s	s	s			h m s	s	s	m s				
Dec 19	1709	+ 29 6	N	*I P E*	5 22 39 42	− 1 98	37 44	N	*I P E*	5 36 7 31	− 1 28	6 03	13 28 59	m s 13 28 595	− 0 044	− 0 254	13 28 297
	1723	+ 32 7	N	d c − 5 3	25 32 48	− 2 05	30 43	N	d c + 7 2	38 58 58	+ 0 45*	59 03	28 60				
	1742	+ 23 58	N	b − 1 3 a + 40 4	28 41 73	− 1 88	39 85	N	b + 7 7 a − 15 5	42 9 81	− 1 33	8 48	28 63				
	1764	+ 26 52	N	s Q − 1 61	30 14 62	− 1 93	12 69	N	s Q − 1 70	43 40 86	+ 0 39*	41 25	28 56				
	1686	+ 1 45	S		5 18 58 54	− 1 51	57 03	S		5 32 25 37	+ 0 19*	25 56	13 28 53	m s 13 28 570	− 0 044	− 0 254	13 28 272
	1696	+ 21 51	S		20 59 18	− 1 84	57 34	S		34 27 30	− 1 35	25 95	28 61				
	1714	+ 22 23	S		24 2 54	− 1 85	0 69	S		3[illegible] 30 57	− 1 34	29 23	28 54				
	1737	+ 14 14	S		27 36 22	− 1 70	34 52	S		41 4 53	− 1 41	3 12	28 60				
Dec 20	1602	+ 38 22	N	*I P E*	5 5 57 7[illegible]	− 2 21	55 56	N	*I P W*	5 19 22 57	+ 1 44	24 01	13 28 45	m s 13 28 513	− 0 038	− 0 254	13 28 221
	1620	+ 22 10	N	d c − 5 3	8 53 28	− 1 86	51 43	N	d c − 8 8	22 18 6	+ 1 34	19 97	28 55				
	1627	+ 33 16	N	b − 1 9 a + 40 4	10 60 80	− 2 08	58 72	N	b − [illegible] a − 19 8	24 25 [illegible]	+ 1 40	27 19	28 47				
	1637	+ 21 59	N	s Q − 1 60	12 42 33	− 1 85	40 48	N	s Q + 1 74	26 7 72	+ 1 34	9 06	28 58				
	1591	+ 15 28	S		5 3 25 97	− 1 72	24 25	S		5 16 51 50	+ 1 31	52 81	13 28 56	m s 13 28 563	− 0 038	− 0 254	13 28 271
	1651	+ 19 42	S		14 28 8[illegible]	− 1 81	27 06	S		27 54 32	+ 1 33	55 65	28 59				
	1657	− 0 31	S		15 55 94	− 1 48	54 46	S		29 21 83	1 21	23 04	28 58				
	1660	− 0 29	S		16 9 76	− 1 48	8 28	S		29 35 59	+ 1 21	36 80	28 52				
	1709	+ 29 6	N	s Q − 1 60	5 22 44 18	− 1 99	42 19	N	s Q − 1 74	5 36 12 83	− 2 11	10 72	13 28 53	m s 13 28 440	− 0 038	− 0 254	13 28 148
	1723	+ 32 7	N		25 37 33	− 2 06	35 27	N		39 5 70	− 2 08	3 62	28 35				
	1742	+ 23 58	N		28 46 58	− 1 89	44 69	N		42 15 22	− 2 13	13 09	28 40				
	1764	+ 26 52	N		30 19 42	− 1 94	17 48	N		43 48 07	− 2 11	45 96	28 48				
	1686	+ 1 45	S		5 19 3 34	− 1 51	1 83	S		5 32 32 52	− 2 25	30 27	13 28 44	m s 13 28 443	− 0 038	− 0 254	13 28 151
	1695	21 51	S		21 4 04	− 1 85	2 19	S		34 32 73	− 2 14	30 59	28 40				
	1714	+ 22 23	S		24 7 29	− 1 86	5 43	S		37 36 05	− 2 14	33 91	28 48				
	1737	+ 14 14	S		27 41 03	− 1 70	39 33	S		41 9 96	− 2 18	7 78	28 45				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES ΔL − ρ.

WALTAIR (E) *Lat* 17° 43′ *Long* 5ʰ 33ᵐ 26ˢ; AND JUBBULPORE (W) *Lat* 23° 10′ *Long* 5ʰ 19ᵐ 58ˢ

Astronomical Date	Star: B A C Number	Star: Declination	E: Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	W: Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Difference of Corrected Times (W − E): Mean of Group	Correction for Rate of E Clock	Corrns. for Persl. Equations $B_E - C_W = -0^s.254$, $B_E - C_E = -0.254$	ΔL − ρ
1891					h m s	s	s			h m s	s	s	m s				
De 21	1602	+ 38 22	N	I P W	5 5 61 23	− 2 37	58 86	N	I P W	5 19 26 11	+ 1 37	27 48	13 28 62	13 28 610	− 0 032	− 0 254	13 28 324
	1627	+ 33 16	N	d c − 1 5	11 4 24	− 2 20	2 04	N	d c − 8 8	24 29 24	+ 1 34	30 58	28 54				
	1637	+ 21 59	N	b − 5 6 a + 14 6	12 45 70	− 1 90	43 80	N	b − 8 4 a − 17 2	26 11 17	+ 1 30	12 47	28 67				
				Q − 1 63					Q + 1 72								
	1723	+ 32 7	N	Q − 1 63	5 25 40 81	− 2 17	38 64	N	Q − 1 72	5 39 9 33	− 2 10	7 23	13 28 59	13 28 667	− 0 032	− 0 254	13 28 381
	1742	+ 23 8	N		28 49 97	− 1 96	48 01	N		42 18 84	− 2 14	16 70	28 69				
	1754	+ 26 52	N		30 22 84	− 2 03	20 81	N		43 51 65	− 2 12	49 53	28 72				
	1695	+ 21 51	S		5 21 7 45	− 1 89	5 56	S		5 34 36 33	− 2 14	34 19	13 28 63	13 28 683	− 0 032	− 0 254	13 28 397
	1714	+ 22 23	S		24 10 70	− 1 91	8 79	S		37 39 63	− 2 14	37 49	28 70				
	1737	+ 14 14	S		27 44 33	− 1 71	42 62	S		41 13 51	− 2 17	11 34	28 72				
Dec 28	1602	+ 38 22	N	I P W	5 6 5 11	+ 0 49	5 60	N	I I W	5 19 32 95	+ 1 37	34 32	13 28 72	13 28 623	− 0 030	− 0 254	13 28 339
	1620	+ 22 10	N	d c − 1 5	9 0 12	+ 1 35	1 47	N	d c − 8 8	22 28 78	+ 1 30	30 08	28 61				
	1627	+ 33 16	N	b − 6 9 a + 103 8	11 7 97	+ 0 79	8 76	N	b − 8 6 a − 17 7	24 36 00	+ 1 34	37 34	28 58				
	1637	+ 21 59	N	Q + 1 76	12 49 23	+ 1 36	50 59	N	Q + 1 73	26 17 87	+ 1 30	19 17	28 58				
	1651	+ 19 43	S		5 14 35 65	+ 1 48	37 13	S		5 28 4 54	+ 1 30	5 84	13 28 71	13 28 680	− 0 030	− 0 254	13 28 396
	1657	− 0 31	S		16 2 22	+ 2 31	4 53	S		29 32 02	+ 1 19	33 21	28 68				
	1660	− 0 29	S		16 16 04	+ 2 31	18 35	S		29 45 81	+ 1 19	47 00	28 65				

Transits observed at E: By Burrard with Telescope No 1. Transits observed at W: By Lenox Conyngham with Telescope No 2.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

WALTAIR (E) *Lat 17° 43′, Long 5ʰ 33ᵐ 26ˢ* AND JUBBULPORE (W) *Lat 23° 10′, Long 5ʰ 19ᵐ 58ˢ*

Astronomical Date	Star		Transits Observed at E — *By Burrard with Telescope No 1*					Transits Observed at W — *By Lenox Conyngham with Telescope No 2*					Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns for Persl Equations $B_N - C_N = 0^s 254$, $B_S - C_S = 0 254$	$\Delta L - \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1891		° ′			h m s	s	s			h m s	s	s	m s	m s	s	s	m s
Dec 23	1709	+ 29 6	N	*I P W* d c − 1 5 b − 6 9 a + 103 8 Q − 1.76 s	5 22 54 81	− 2 49	52 32	N	*I P W* d c − 8 8 b − 8 6 a − 17 7 Q − 1.73 s	5 36 23 10	− 2 13	20 97	13 28 65	= 13 28 700	− 0 030	− 0 254	13 28 416
	1723	+ 32 7	N		25 47 92	− 2 67	45 25	N		39 16 02	− 2 11	13 91	28 66				
	1754	+ 26 52	N		30 29 93	− 2 39	27 54	N		43 58 47	− 2 14	56 33	28 79				
	1685	+ 1 45	S		5 10 13 14	− 1 30	11 84	S		5 32 42 81	− 2 26	40 55	13 28 71	= 13 28 677	− 0 030	− 0 254	13 28 393
	1695	+ 21 51	S		21 14 37	− 2 15	12 22	S		34 43 07	− 2 16	40 91	28 69				
	1714	+ 22 23	S		24 17 74	− 2 18	15 56	S		37 46 35	− 2 16	44 19	28 63				
Dec 24	1657	− 0 31	S	*I P W* d c − 1 5 b − 7 1 a + 119 7 Q + 1.74 s	5 16 5 24	+ 2 40	7 64	S	*I P E* d c + 7 2 b − 0 6 a − 18 0 Q + 1.71 s	5 29 34 63	+ 1 70	36 33	13 28 69	= 13 28 705	− 0 029	− 0 254	13 28 422
	1660	− 0 29	S		16 19 03	+ 2 40	21 43	S		29 48 45	+ 1 70	50 15	28 72				
	1709	+ 29 6	N	Q + 1.74 s	5 22 54 42	+ 0 92	55 34	N	Q − 1.71 s	5 36 25 60	− 1 50	24 10	13 28 76	= 13 28 748	− 0 029	− 0 254	13 28 465
	1723	+ 32 7	N		25 47 65	+ 0 73	48 38	N		39 18 59	− 1 47	17 12	28 74				
	1742	+ 23 58	N		28 56 62	+ 1 21	57 83	N		42 28 07	− 1 53	26 54	28 71				
	1754	+ 26 52	N		30 29 54	+ 1 04	30 58	N		43 60 88	− 1 52	59 36	28 78				
	1685	+ 1 45	S		5 19 12 73	+ 2 30	15 03	S		5 32 45 33	− 1 71	43 62	13 28 59	= 13 28 660	− 0 029	− 0 254	13 28 377
	1695	+ 21 51	S		21 14 02	+ 1 33	15 35	S		34 45 58	− 1 56	44 02	28 67				
	1714	+ 22 23	S		24 17 37	+ 1 29	18 66	S		37 48 91	− 1 56	47 35	28 69				
	1737	+ 14 14	S		27 50 74	+ 1 72	52 46	S		41 22 76	− 1 61	21 15	28 69				

WALTAIR (E) *Lat 17° 43′, Long 5h 33m 26s*; AND JUBBULPORE (W) *Lat. 23° 10′ Long 5h 19m 58s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	(W − E): Mean of Group	Correction for Rate of W Clock	Corrns for Pers[onal] Equations $B_E - C_E = -0.254$, $B_W - C_W = -0.254$	$\Delta L + \rho$
1891					h m s	s	s			h m s	s	s	m s	m s			
Dec 18	2029	+ 23 19	N	*I P W*	5 58 56 13	+0 74	56 87	N	*I P E*	6 12 25 56	+0 33	25 89	13 29 02	13 29 047	− 0 014	− 0 254	13 28 779
	2047	+ 22 34	N	d c − 6 5	6 2 34 07	−0 26	33 81	N	d c + 7 2	16 53	+0 32	2 85	29 04				
	2067	+ 21 42	N	b − 3 0 a + 12 0	5 22 21	−0 25	21 96	N	b + 6 2 a − 12 8	18 50 73	+0 31	51 04	29 08				
				s Q 0 00					s Q 0 00								
	2012	+ 12 35	S		5 55 49 30	−0 20	49 10	S		6 9 17 94	+0 26	18 20	13 29 10	13 29 140	− 0 014	− 0 254	13 28 872
	2022	+ 9 59	S		57 17 66	−0 18	17 48	S		10 46 41	+0 23	46 64	29 16				
	2057	+ 3 49	S		6 3 45 30	−0 16	45 14	S		17 14 10	+0 20	14 30	29 16				
	2086	+ 0 22	S		7 49 32	−0 13	49 19	S		21 18 15	+0 18	18 33	29 14				
	2110	+ 32 32	N	s Q 0 00	6 11 32 96	−0 33	32 63	N	s Q 0 00	6 25 1 17	+0 41	1 58	13 28 95	13 29 020	− 0 014	− 0 254	13 28 752
	2155	+ 39 29	N		17 19 25	−0 40	18 85	N		30 47 41	+0 48	47 89	29 04				
	2170	+ 28 22	N		18 53 02	−0 31	52 71	N		32 21 38	+0 37	21 75	29 04				
	2178	+ 28 18	N		20 41 07	−0 31	40 76	N		34 9 44	+0 37	9 81	29 05				
	2128	+ 4 56	S		6 12 33 54	−0 16	33 38	S		6 26 2 22	+0 20	2 42	13 29 04	13 29 058	− 0 014	− 0 254	13 28 790
	2140	+ 16 17	S		14 48 53	−0 21	48 32	S		28 17 11	+0 27	17 38	29 06				
	2191	+ 17 45	S		22 15 41	−0 22	15 19	S		35 43 93	+0 29	44 22	29 03				
	2199	+ 13 20	S		24 2 19	−0 20	1 99	S		37 30 83	+0 26	31 09	29 10				
Dec 19	2029	+ 23 19	N	*I P E*	5 58 57 05	+1 35	58 40	N	*I P E*	6 12 25 26	+2 07	27 33	13 28 93	13 28 883	− 0 012	− 0 254	13 28 617
	2088	+ 21 11	N	d c − 5 3	6 0 55 32	+1 39	56 71	N	d c + 7 2	14 23 62	+2 04	25 66	28 95				
	2047	+ 22 34	N	b − 1 3 a + 40 4	2 34 03	+1 37	35 40	N	b + 7 7 a − 15 5	16 2 11	+2 06	4 17	28 77				
				s Q + 1 61					s Q + 1 70								
	2012	+ 12 35	S		5 55 49 12	+1 54	50 66	S		6 9 19 24	+0 27*	19 51	13 28 85	13 28 867	− 0 012	− 0 254	13 28 601
	2022	+ 9 59	S		57 17 48	+1 59	19 07	S		10 45 98	+1 95	47 93	28 86				
	2086	+ 0 22	S	s Q − 1 61	6 7 52 25	−1 49	50 76	S		21 19 46	+0 19*	19 65	28 89				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

WALTAIR (E) *Lat* 17° 48′, *Long* $5^h\ 33^m\ 26^s$; AND JUBBULPORE (W) *Lat* 23° 10′, *Long* $5^h\ 19^m\ 58^s$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $B_N - C_N = -0^s 254$, $B_S - C_S = -0\ 254$	$\Delta L + \rho$
1891					h m s	s	s			h m s	s	s	m s				
Dec 19	2110	+ 32 32	N	*I P E*	6 11 36 18	− 2 05	34 13	N	*I P E*	6 25 2 61	+ 0 46*	3 07	13 28 94	m s 13 28 895	− 0 012	− 0 254	13 28 629
	2155	+ 39 29	N	d c − 5 3	17 22 71	− 2 23	20 48	N	d c + 7 2	30 48 71	+ 0 55*	49 26	28 78				
	2170	+ 28 22	N	b − 1 3 a + 40 4	18 56 27	− 1 96	54 31	N	b + 7 7 a − 15 5	32 22 82	+ 0 41*	23 23	28 92				
	2178	+ 28 18	N	s Q − 1 61	20 44 29	− 1 96	42 33	N	s Q − 1 70	34 12 56	− 1 29	11 27	28 94				
	2140	+ 16 17	S		6 14 51 53	− 1 74	49 79	S		6 28 18 49	+ 0 31*	18 80	13 29 01	m s 13 28 900	− 0 012	− 0 254	13 28 634
	2191	+ 17 45	S		22 18 56	− 1 76	16 80	S		35 47 03	− 1 38	45 65	28 85				
	2199	+ 13 20	S		24 5 31	− 1 69	3 62	S		37 33 88	− 1 42	32 46	28 84				
Dec 20	2029	+ 23 19	N	*I P E*	5 58 58 14	+ 1 34	59 48	N	*I P W*	6 12 27 04	+ 1 35	28 39	13 28 91	m s 13 28 888	− 0 010	− 0 254	13 28 624
	2038	+ 21 11	N	d c − 5 3	6 0 56 40	+ 1 38	57 78	N	d c − 8 8	14 25 35	+ 1 33	26 68	28 90				
	2047	+ 22 34	N	b − 1 9 a + 40 4	2 35 15	+ 1 36	36 51	N	b − 7 3 a − 19 8	16 3 97	+ 1 35	5 32	28 81				
	2067	+ 21 42	N	s Q + 1 62	5 23 27	+ 1 37	24 64	N	s Q + 1 74	18 52 23	+ 1 34	53 57	28 93				
	2012	+ 12 35	S		5 55 50 28	+ 1 54	51 82	S		6 9 19 38	+ 1 30	20 68	13 28 86	m s 13 28 853	− 0 010	− 0 254	13 28 589
	2022	+ 9 59	S		57 18 64	+ 1 59	20 23	S		10 47 76	+ 1 28	49 04	28 81				
	2057	+ 3 49	S		6 3 46 22	+ 1 68	47 90	S		17 15 53	+ 1 24	16 77	28 87				
	2086	+ 0 22	S		7 50 14	+ 1 73	51 87	S		21 19 52	+ 1 22	20 74	28 87				
	2110	+ 32 32	N	s Q + 1 62	6 11 34 12	+ 1 16	35 28	N	s Q − 1 74	6 25 6 13	− 2 07	4 06	13 28 78	m s 13 28 865	− 0 010	− 0 254	13 28 601
	2155	+ 39 29	N		17 20 49	+ 0 98	21 47	N		30 52 39	− 2 04	50 35	28 88				
	2170	+ 28 22	N		18 54 11	+ 1 25	55 36	N		32 26 34	− 2 09	24 25	28 89				
	2178	+ 28 18	N		20 42 19	+ 1 25	43 44	N		34 14 44	− 2 09	12 35	28 91				
	2123	+ 4 56	S		6 12 34 46	+ 1 66	36 12	S		6 26 7 09	− 2 24	4 85	13 28 73	m s 13 28 760	− 0 010	− 0 254	13 28 496
	2140	+ 16 17	S		14 49 45	+ 1 48	50 93	S		28 21 99	− 2 18	19 81	28 88				
	2191	+ 17 45	S		22 16 49	+ 1 46	17 95	S		35 48 77	− 2 16	46 61	28 66				
	2199	+ 13 20	S		24 5 15	+ 1 53	4 68	S		37 35 64	− 2 19	33 45	28 77				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in these cases Q = 0 00.

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

WALTAIR (E) *Lat 17° 43′, Long 5h 33m 26s* **AND JUBBULPORE (W)** *Lat 23° 10′, Long 5h 19m 58s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox-Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl. Equations $B_W - C_W = - 0^s 254$, $B_S - C_S = - 0\ 254$	$\Delta L + \rho$
		° ′			h m s	s	s			h m s	s	s	m s	m s	s	s	m s
1891 Dec 21	2038	+ 21 11	N	I P W d c − 1 5 b − 5 6 a + 54 6 Q + 1 60 s	6 0 57 48	+ 1 35	58 83	N	I P W d c − 8 8 b − 8 4 a − 17 2 Q + 1 72 s	6 14 26 59	+ 1 30	27 89	13 29 06	13 29 005	− 0 008	− 0 254	13 28 743
	2047	+ 22 34	N		2 36 19	+ 1 31	37 50	N		16 5 14	+ 1 31	6 45	28 95				
	2022	+ 9 59	S		5 57 19 52	+ 1 61	21 13	S		6 10 49 01	+ 1 24	50 25	13 29 12	13 29 010	− 0 008	− 0 254	13 28 748
	2057	+ 3 49	S		6 3 47 13	+ 1 74	48 87	S		17 16 66	+ 1 21	17 87	29 00				
	2066	+ 0 22	S		7 51 15	+ 1 82	52 97	S		21 20 68	+ 1 20	21 88	28 91				
	2110	+ 32 32	N	Q + 1 60 s	6 11 35 11	+ 1 05	36 16	N	Q − 1 72 s	6 25 7 44	− 2 10	5 34	13 29 18	13 29 180	− 0 008	− 0 254	13 28 918
	2128	+ 4 56	S		6 12 35 34	+ 1 72	37 06	S		6 26 8 42	− 2 22	6 20	13 29 14	13 29 073	− 0 008	− 0 254	13 28 811
	2191	+ 17 45	S		22 17 40	+ 1 43	18 83	S		35 50 08	− 2 17	47 91	29 08				
	2199	+ 13 20	S		24 4 26	+ 1 53	5 79	S		37 36 97	− 2 18	34 79	29 00				
Dec 23	2029	+ 23 19	N	I P W d c − 1 5 b − 6 9 a + 103 8 Q + 1 71 s	5 59 0 41	+ 1 25	1 66	N	I P W d c − 8 8 b − 8 6 a − 17 7 Q + 1 73 s	6 12 29 38	+ 1 31	30 69	13 29 03	13 28 990	− 0 004	− 0 254	13 28 ,32
	2038	+ 21 11	N		6 0 58 61	+ 1 35	59 96	N		14 27 64	+ 1 30	28 94	28 98				
	2047	+ 22 34	N		2 37 40	+ 1 28	38 68	N		16 6 32	+ 1 31	7 63	28 95				
	2067	+ 21 42	N		5 25 49	+ 1 32	26 81	N		18 54 51	+ 1 30	55 81	29 00				
	2022	+ 9 59	S		5 57 20 58	+ 1 84	22 42	S		6 10 50 11	+ 1 25	51 36	13 28 94	13 28 960	− 0 004	− 0 254	13 28 ,02
	2057	+ 3 49	S		6 3 47 97	+ 2 09	50 06	S		17 17 85	+ 1 22	19 07	29 01				
	2066	+ 0 22	S		7 51 85	+ 2 23	54 08	S		21 21 81	+ 1 20	23 01	28 93				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

WALTAIR (E) *Lat* 17° 48′ *Long* 5h 33m 26s, AND JUBBULPORE (W) *Lat* 23° 10′, *Long* 5h 19m 58s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $B_W - C_W = - 0^s 254$ $B_E - C_E = - 0 254$	$\Delta L + \rho$
1891					h m s	s	s			h m s	s	s	m s				
Dec 23	2110	+ 32 32	N	*I P W*	6 11 40 11	− 2 64	37 47	N	*I P W*	6 25 8 57	− 2 11	6 46	13 28 99	m s 13 29 003	− 0 004	− 0 254	13 8 745
	2155	+ 39 29	N	d c − 1 5	17 26 77	− 3 06	23 71	N	d c − 8 8	30 54 86	− 2 09	52 77	29 06				
	2170	+ 28 22	N	b − 6 9 a + 103 8	18 60 04	− 2 41	57 63	N	b − 8 6 a − 17 7	32 28 ,8	− 2 13	26 65	29 02				
	2178	+ 28 18	N	s Q − 1 71	20 48 10	− 2 41	45 69	N	s Q − 1 73	34 16 76	− 2 13	14 63	28 94				
	2123	+ 4 56	S		6 12 39 67	− 1 37	38 30	S		6 26 9 52	− 2 23	7 29	13 28 99	m s 13 28 967	− 0 004	− 0 254	13 28 709
	2191	+ 17 45	S		22 22 00	− 1 91	20 09	S		35 51 19	− 2 18	49 01	28 92				
	2199	+ 13 20	S		24 8 60	− 1 72	6 88	S		37 38 07	− 2 20	35 87	28 99				
Dec 24	2029	+ 23 19	N	*I P W*	5 59 4 14	− 2 22	1 92	N	*I P E*	6 12 29 03	+ 1 88	30 91	13 28 99	m s 13 29 005	− 0 002	− 0 254	13 28 ,49
	2038	+ 21 11	N	d c − 1 5	6 1 2 27	− 2 10	0 17	N	d c + 7 2	14 27 3,	+ 1 86	29 23	29 06				
	2047	+ 22 34	N	b − 7 1 a + 119 7	2 41 08	− 2 18	38 90	N	b − 0 6 a − 18 0	16 5 97	+ 1 87	7 84	28 94				
	2067	+ 21 41	N	s Q − 1 72	5 29 15	− 2 13	27 02	N	s Q + 1 72	18 54 19	+ 1 86	56 05	29 03				
	2012	+ 12 35	S		5 55 55 86	− 1 67	54 19	S		6 9 21 35	+ 1 79	23 14	13 28 96	m s 13 29 010	− 0 002	− 0 254	13 28 754
	2022	+ 9 59	S		57 24 07	− 1 54	22 53	S		10 49 78	+ 1 77	51 55	29 02				
	2057	+ 3 49	S		6 3 51 50	− 1 25	50 25	S		17 17 54	+ 1 73	19 27	29 02				
	2086	+ 0 22	S		7 55 30	− 1 10	54 20	S		21 21 56	+ 1 70	23 25	29 05				
	2110	+ 32 32	N	s Q − 1 ,2	6 11 40 33	− 2 75	3, 58	N	s Q − 1 71	6 25 8 17	− 1 46	6 71	13 29 13	m s 13 29 138	− 0 002	− 0 254	13 28 882
	2155	+ 39 29	N		17 27 04	− 3 24	23 80	N		30 54 34	− 1 37	52 97	29 17				
	2170	+ 28 22	N		18 60 26	− 2 50	57 76	N		32 28 35	− 1 51	26 84	29 08				
	2178	+ 28 18	N		20 48 21	− 2 50	45 71	N		34 16 39	− 1 51	14 88	29 17				
	2123	+ 4 56	S		6 12 39 79	− 1 31	38 48	S		6 26 9 26	− 1 69	7 57	13 29 09	m s 13 29 113	− 0 002	− 0 254	13 28 857
	2140	+ 16 1,	S		14 55 15	− 1 85	53 30	S		28 24 03	− 1 60	22 43	29 13				
	2191	+ 17 45	S		22 22 10	− 1 93	20 17	S		35 50 87	− 1 89	49 28	29 11				
	2199	13 20	S		24 8 69	− 1 71	6 98	S		37 37 72	− 1 62	36 10	29 12				

WALTAIR (E) Lat 17° 43 Long 5h 33m 26s AND MADRAS (W) Lat 13° 4, Long 5h 21m 8s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Persl. Equations $B_E - C_E = -0^s 254$, $B_S - C_S = -0\ 254$	$\Delta L - \rho$
1892		°			h m s	s	s			h m s	s	s	m s				
Jan 6	2110	+ 32 32	N	I P W	6 25 29 39	+0 36	29 75	N	I P E	6 37 48 78	−1 93	46 85	12 17 10	m s 12 17 158	− 0 024	− 0 254	12 16 880
	2130	+ 31 31	N	d c − 5 4	28 7 62	+0 44	8 06	N	d c + 7 5	40 27 13	−1 91	25 22	17 16				
	2149	+ 16 53	N	b − 4 1 a +162 0	29 50 70	+1 53	52 23	N	b + 1 4 a + 49 5	42 11 00	−1 60	9 40	17 17				
	2163	+ 16 30	N	s Q + 1 70	31 32 10	+1 55	33 65	N	s Q − 1 73	43 52 44	−1 59	50 85	17 20				
	2105	− 6 58	S		6 23 37 20	+3 02	40 22	S		6 35 58 50	−1 14	57 36	12 17 14	m s 12 17 160	− 0 024	− 0 254	12 16 882
	2123	+ 4 56	S		26 38 31	+2 30	40 61	S		38 59 16	−1 37	57 79	17 18				
	2184	+ 16 30	N	s Q − 1 70	6 35 15 25	−1 85	13 40	N	s Q + 1 73	6 47 28 66	+1 87	30 53	12 17 13	m s 12 17 065	− 0 024	− 0 254	12 16 787
	2191	+ 17 45	N		36 14 35	−1 93	12 42	N		48 27 58	+1 85	29 43	17 01				
	2230	+ 13 32	N		44 26 72	−1 63	25 09	N		56 40 38	+1 84	42 22	17 13				
	2237	+ 34 6	N		45 48 99	3 19	45 80	N		58 1 30	+1 49	2 79	16 99				
	2109	+ 13 20	S		6 37 60 89	−1 63	59 26	S		6 50 14 38	+1 93	16 31	12 17 05	m s 12 17 113	− 0 024	− 0 254	12 16 835
	2206	+ 13 1	S		39 20 65	−1 60	19 05	S		51 34 15	+1 93	36 08	17 03				
	2211	+ 8 42	S		40 45 68	−1 33	44 35	S		52 59 52	+2 01	61 53	17 18				
	2222	+ 2 32	S		42 20 07	−0 95	19 12	S		54 34 18	+2 13	36 31	17 19				
Jan 7	2110	+ 32 32	N	I P E	6 25 31 77	+0 77	32 54	N	I P E	6 37 48 08	+1 43	49 51	12 16 97	m s 12 16 980	− 0 025	− 0 254	12 16 701
	2130	+ 31 31	N	d c + 3 6	28 10 02	+0 85	10 87	N	d c + 2 5	40 26 34	+1 45	27 79	16 92				
	2149	+ 16 53	N	b + 7 6 a +180 2	29 53 03	+2 03	55 06	N	b − 0 1 a + 44 4	42 10 30	+1 74	12 04	16 98				
	2163	+ 16 30	N	s Q + 1 70	31 34 38	+2 05	36 43	N	s Q + 1 75	43 51 73	+1 75	53 48	17 05				
	2086	+ 0 22	S		6 21 46 00	+3 15	49 15	S		6 34 4 10	+2 03	6 13	12 16 98	m s 12 17 020	− 0 025	− 0 254	12 16 41
	2094	− 4 42	S		22 42 26	+3 49	45 75	S		35 0 61	+2 12	2 73	16 98				
	2105	− 6 58	S		23 39 37	+3 63	43 00	S		35 57 91	+2 16	60 07	17 07				
	2123	+ 4 56	S		26 40 57	+2 85	43 42	S		38 58 52	+1 95	60 47	17 05				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$.

WALTAIR (E) *Lat 17° 48′, Long 5h 33m 26s*; AND MADRAS (W) *Lat 13° 4′, Long 5h 21m 8s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham, with Telescope No. 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Persl. Equations $B_W - C_W = -0^s.254$, $B_S - C_S = -0.254$	$\Delta L - \rho$
1892					h m s	s	s			h m s	s	s	m s				
Jan 7	2184	+ 16 30	N	*I P E*	6 35 17 69	−1 35	16 34	N	*I P E*	6 47 35 04	−1 75	33 29	12 16 95	m s 12 16 990	− 0 025	− 0 254	12 16 711
	2191	+ 17 45	N	d c + 3 6	36 16 64	−1 44	15 20	N	d c + 2 5	48 33 93	−1 77	32 16	16 96				
	2230	+ 13 32	N	b + 7 6 a +180 2	44 29 08	−1 14	27 94	N	b − 0 1 a + 44 4	56 46 76	−1 77	44 99	17 05				
	2237	+ 34 6	N	s Q − 1 70	49 51 41	−2 77	48 64	N	s Q − 1 75	58 7 75	−2 11	5 64	17 00				
	2199	+ 13 20	S		6 38 3 21	−1 14	2 07	S		6 50 20 78	−1 69	19 09	12 17 02	m s 12 17 063	− 0 025	− 0 254	12 16 784
	2206	+ 13 1	S		39 22 99	−1 11	21 88	S		51 40 61	−1 69	38 92	17 04				
	2211	+ 8 42	S		40 47 98	−0 80	47 18	S		53 5 94	−1 61	4 33	17 15				
	2222	+ 2 32	S		42 22 37	−0 40	21 97	S		54 40 52	−1 51	39 01	17 04				
Jan 10	2110	+ 32 32	N	*I P E*	6 25 41 57	+0 31	41 88	N	*I P W*	6 37 57 28	+1 55	58 83	12 16 95	m s 12 16 925	− 0 026	− 0 254	12 16 645
	2130	+ 31 31	N	d c − 1 4	28 19 82	+0 42	20 24	N	d c − 4 3	40 35 62	+1 55	37 17	16 93				
	2149	+ 16 53	N	b + 6 0 a +220 3	30 2 55	+1 90	4 45	N	b − 6 5 a − 9 6	42 19 81	+1 51	21 32	16 87				
	2168	+ 16 30	N	s Q + 1 70	31 43 97	+1 92	45 89	N	s Q + 1 74	44 1 34	+1 50	2 84	16 95				
	2105	− 6 58	S		6 23 48 46	+3 86	52 32	S		6 36 7 91	+1 43	9 34	12 17 02	m s 12 17 000	− 0 026	− 0 254	12 16 720
	2123	+ 4 56	S		26 49 92	+2 90	52 82	S		39 8 33	+1 47	9 80	16 98				
	2230	+ 13 32	N	s Q − 1 70	6 44 38 58	−1 22	37 36	N	s Q − 1 74	6 56 56 40	−1 97	54 43	12 17 07	m s 12 17 025	− 0 026	− 0 254	12 16 745
	2237	+ 34 6	N		45 61 28	−3 25	58 03	N		58 16 94	−1 93	15 01	16 98				

WALTAIR (E) *Lat* 17° 43′, *Long* 5h 33m 26s; AND MADRAS (W) *Lat* 13° 4′, *Long* 5h 21m 8s.

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard, with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham, with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrn. for Persl. Equations $B_W - C_W = -0\ 254$, $B_E - C_E = -0\ 254$	ΔL − ρ
1892					h m s	s	s			h m s	s	s	m s				
Jan 10	2199	+ 13 20	S	*I P E*	6 38 12 70	−1 22	11 48	S	*I P W*	6 50 30 38	−1 99	28 39	12 16 91	m s 12 16 930	− 0 026	− 0 254	12 16 650
	2206	+ 13 1	S	d c − 1 4	39 32 49	−1 17	31 32	S	d c − 4 3	51 50 18	−1 99	48 19	16 87				
	2211	+ 8 42	S	b + 6 0	40 57 40	−0 81	56 59	S	b − 6 5	53 15 60	−2 01	13 59	17 00				
	2222	+ 2 32	S	a + 220 3 s Q − 1 70	42 31 65	−0 30	31 35	S	a − 9 6 s Q − 1 74	54 50 51	−2 02	48 29	16 94				
Jan 11	2110	+ 32 32	N	*I P W*	6 25 44 72	+0 19	44 91	N	*I P W*	6 38 0 42	+1 61	2 03	12 17 12	m s 12 17 128	− 0 026	− 0 254	12 16 848
	2130	+ 31 31	N	d c − 0 4	28 22 80	+0 31	23 11	N	d c − 4 3	40 38 75	+1 60	40 35	17 24				
	2149	+ 16 53	N	b + 4 8	30 5 47	+1 90	7 37	N	b − 5 7	42 23 04	+1 51	24 55	17 18				
	2163	+ 16 30	N	a + 237 6 s Q + 1 70	31 46 96	+1 92	48 88	N	a − 16 7 s Q + 1 71	44 4 35	+1 50	5 85	16 97				
	2086	+ 0 22	S		6 21 58 17	+3 38	61 55	S		6 34 17 16	+1 41	18 57	12 17 02	m s 12 17 033	− 0 026	− 0 254	12 16 753
	2094	− 4 42	S		22 54 30	+3 84	58 14	S		35 13 69	+1 37	15 06	16 92				
	2105	− 6 58	S		23 51 37	+4 03	55 40	S		36 11 11	+1 36	12 47	17 07				
	2123	+ 4 56	S		26 52 81	+2 99	55 80	S		39 12 49	+1 43	12 92	17 12				
	2184	+ 16 30	N	s Q − 1 70	6 35 30 13	−1 48	28 65	N	s Q − 1 71	6 47 47 54	−1 92	45 62	12 16 97	m s 12 17 035	− 0 026	− 0 254	12 16 755
	2191	+ 17 45	N		36 29 11	−1 60	21 51	N		48 46 51	−1 91	44 60	17 09				
	2230	+ 13 32	N		44 41 54	−1 20	40 34	N		56 59 34	−1 91	57 43	17 09				
	2237	+ 34 6	N		46 4 41	−3 40	1 01	N		58 19 81	−1 81	18 00	16 99				
	2199	+ 13 20	S		6 38 15 64	−1 20	14 44	S		6 50 33 50	−1 94	31 56	12 17 12	m s 12 17 063	− 0 026	− 0 254	12 16 783
	2206	+ 13 1	S		39 35 37	−1 15	34 22	S		51 53 19	−1 94	51 25	17 03				
	2211	+ 8 42	S		40 60 31	−0 74	59 57	S		53 18 63	−1 97	16 66	17 09				
	2222	+ 2 32	S		42 34 53	−0 21	34 32	S		54 53 34	−2 01	51 33	17 01				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

WALTAIR (Γ) *Lat 17° 43', Long 5h 33m 26* AND MADRAS (W) *Lat 13° 4, Long 5h 21m 8s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $B_W - C_W = -0^s 254$, $B_S - C_S = -0 254$	$\Delta L + \rho$
1892					h m s	s	s			h m s	s	s	m s				
Jan 6	2343	+ 27 2	N	I P W	6 52 22 44	+0 80	23 24	N	I P E	7 4 38 82	+1 65	40 47	12 17 23	m s 12 17 230	+ 0 016	− 0 254	12 16 992
	2350	+ 24 19	N	d c − 5 4	53 33 64	+1 02	34 66	N	d c + 7 5	5 50 09	+1 70	51 79	17 13				
	2410	+ 22 11	N	b − 4 1 a +162 0	7 1 21 24	+1 16	22 40	N	b + 1 4 a +49 5	13 37 86	+1 75	39 61	17 21				
	2423	+ 20 39	N	s Q + 1 70	3 15 18	+1 28	16 46	N	s Q + 1 73	15 32 03	+1 78	33 81	17 35				
	2362	+ 16 21	S		6 54 50 43	+1 57	52 00	S		7 7 7 46	+1 87	9 33	12 17 33	m s 12 17 260	+ 0 016	− 0 254	12 17 022
	2373	+ 3 18	S		56 20 11	+2 40	22 51	S		8 37 54	+2 12	39 66	17 15				
	2308	+ 16 44	S		59 33 62	+1 53	35 15	S		11 50 58	+1 87	52 45	17 30				
	2455	+ 21 45	N	s Q − 1 70	7 8 11 48	−2 21	9 27	N	s Q − 1 73	7 20 28 30	−1 70	26 60	12 17 33	m s 12 17 285	+ 0 016	− 0 254	12 1, 047
	2460	+ 21 40	N		9 3 92	−2 21	1 71	N		21 20 65	−1 70	18 95	17 24				
	2469	+ 28 8	N		10 50 42	−2 69	47 73	N		23 6 85	−1 84	5 01	17 28				
	2472	+ 28 8	N		11 41 49	−2 69	38 80	N		23 57 93	−1 84	56 09	17 29				
	2444	+ 11 53	S		7 6 41 71	−1 54	40 17	S		7 18 59 02	−1 51	57 51	12 17 34	m s 12 1, 90	+ 0 016	− 0 254	12 17 152
	2480	+ 2 9	S		14 12 15	−0 94	11 21	S		26 29 95	−1 32	28 63	17 42				
	2487	+ 3 31	S		15 14 83	−1 02	13 81	S		27 32 59	−1 35	31 24	17 43				
	2491	+ 3 36	S		16 18 82	−1 02	17 80	S		28 36 52	−1 35	35 17	17 37				
Jan 7	2343	+ 27 2	N	I P E	6 52 20 20	+1 24	21 44	N	I P E	7 4 36 94	+1 54	38 48	12 17 04	m s 12 17 108	+ 0 015	− 0 254	12 16 869
	2350	+ 24 19	N	d c + 3 6	53 31 35	+1 48	32 83	N	d c + 2 5	5 48 33	+1 60	49 93	17 10				
	2410	+ 22 11	N	b + 7 6 a +180 2	7 1 18 91	+1 63	20 54	N	b − 0 1 a +44 4	13 36 09	+1 64	37 73	17 19				
	2423	+ 20 39	N	s Q + 1 70	3 12 97	+1 75	14 72	N	s Q + 1 75	15 30 15	+1 67	31 82	17 10				
	2362	+ 16 21	S		6 54 48 20	+2 07	50 27	S		7 7 5 72	+1 75	7 47	12 17 20	m s 12 17 145	+ 0 015	− 0 254	12 16 909
	2373	+ 3 18	S		56 17 65	+2 95	20 60	S		8 35 78	+1 98	37 76	17 16				
	2382	+ 0 2	S		57 24 71	+3 16	27 87	S		9 42 92	+2 04	44 96	17 09				
	2398	+ 16 44	S		59 31 30	+2 03	33 33	S		11 48 73	+1 74	50 47	17 14				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

WALTAIR (E) *Lat. 17° 43′ Long 5ʰ 33ᵐ 26ˢ*; **AND MADRAS (W)** *Lat 13° 4′, Long 5ʰ 21ᵐ 9ˢ*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrn. for Persl. Equations $B_E - C_E = -0^s 254$, $B_W - C_W = -0 254$	$\Delta L + \rho$
1892					h m s	s	s			h m s	s	s	m s				
Jan 7	2455	+ 21 45	N	I P E	7 8 9 15	− 1 74	7 41	N	I P E	7 20 26 57	− 1 85	24 72	12 17 31	m s 12 17 288	+ 0 015	− 0 254	12 17 049
	2460	+ 21 40	N	d c + 3 6	8 61 56	− 1 74	59 82	N	d c + 2 5	21 19 02	− 1 85	17 17	17 35				
	2469	+ 28 8	N	b + 7 6 a + 180 2	10 48 18	− 2 25	45 93	N	b − 0 1 a + 44 4	23 5 04	− 1 98	3 06	17 13				
	2472	+ 28 8	N	s Q − 1 70	11 39 12	− 2 25	36 87	N	s Q − 1 75	23 56 21	− 1 98	54 23	17 36				
	2444	+ 11 53	S		7 6 39 33	− 1 04	38 29	S		7 18 57 22	− 1 67	55 55	12 17 26	m s 12 17 220	+ 0 015	− 0 254	12 16 981
	2480	+ 2 9	S		14 9 86	− 0 38	9 48	S		26 28 13	− 1 50	26 63	17 15				
	2487	+ 3 31	S		15 12 52	− 0 47	12 05	S		27 30 79	− 1 53	29 26	17 21				
	2491	+ 3 36	S		16 16 49	− 0 47	16 02	S		28 34 81	− 1 53	33 28	17 26				
Jan 10	2343	+ 27 2	N	I P E	6 52 15 19	+ 0 91	16 10	N	I P W	7 4 31 79	+ 1 53	33 32	12 17 22	m s 12 17 183	+ 0 012	− 0 254	12 16 941
	2350	+ 24 19	N	d c − 1 4	53 26 37	+ 1 20	27 57	N	d c − 4 3	5 43 24	+ 1 52	44 76	17 19				
	2410	+ 22 11	N	b + 6 0 a + 220 3	7 1 13 96	+ 1 39	15 35	N	b − 6 5 a − 9 6	13 30 98	+ 1 52	32 50	17 15				
	2423	+ 20 39	N	s Q + 1 70	3 7 87	+ 1 55	9 42	N	s Q + 1 74	15 25 07	+ 1 52	26 59	17 17				
	2362	+ 16 21	S		6 54 43 07	+ 1 94	45 01	S		7 7 0 71	+ 1 50	2 21	12 17 20	m s 12 17 190	+ 0 012	− 0 254	12 16 948
	2373	+ 3 18	S		56 12 34	+ 3 03	15 37	S		8 31 08	+ 1 46	32 54	17 17				
	2382	+ 0 2	S		57 19 27	+ 3 30	22 57	S		9 38 25	+ 1 45	39 70	17 13				
	2398	+ 16 44	S		59 26 13	+ 1 90	28 03	S		11 43 79	+ 1 50	45 29	17 26				
	2460	+ 21 40	N	s Q − 1 70	7 8 56 89	− 1 96	54 63	N	s Q − 1 74	7 21 13 84	− 1 96	11 88	12 17 25	m s 12 17 183	+ 0 012	− 0 254	12 16 941
	2469	+ 28 8	N		10 43 22	− 2 60	40 62	N		22 59 67	− 1 95	57 72	17 10				
	2472	+ 28 8	N		11 34 35	− 2 60	31 75	N		23 50 90	− 1 95	48 95	17 20				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

WALTAIR (E) *Lat 17° 43′ Long 5h 33m 26* : AND MADRAS (W) *Lat 13° 4′ Long 5h 21m 9s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $B_E - C_W = -0^s 254$, $B_S - C_S = -0\ 254$	$\Delta L + \rho$
189°		° ′			h m s	s	s			h m s	s	s	m s	m s			
Jan 10	2444	+ 11 53	S	*I P E* d c − 1 4 b + 6 0 a + 220 3 s Q − 1 70	7 6 34 13	−1 08	33 05	S	*I P W* d c − 4 3 b − 6 5 a − 9 6 s Q − 1 74	7 18 52 37	−1 99	50 38	12 17 33	12 17 238	+ 0 012	− 0 254	12 16 996
	2480	+ 2 9	S		14 4 50	−0 28	4 22	S		26 23 48	−2 02	21 46	17 24				
	2487	+ 3 31	S		15 7 24	−0 39	6 85	S		27 26 08	−2 02	24 06	17 21				
	2491	+ 3 36	S		16 11 19	−0 39	10 80	S		28 29 99	−2 02	27 97	17 17				
Jan 11	2343	+ 27 2	N	*I P W* d c − 0 4 b + 4 8 a + 237 6 s Q + 1 70	6 52 14 22	+0 83	15 05	N	*I P W* d c − 4 3 b − 5 7 a − 16 7 s Q + 1 71	7 4 30 57	+1 56	32 13	12 17 08	12 17 1,0	+ 0 010	− 0 254	12 16 926
	2350	+ 24 19	N		53 25 31	+1 14	26 45	N		5 42 10	+1 54	43 64	17 19				
	2410	+ 22 11	N		7 1 12 83	+1 36	14 19	N		13 29 84	+1 53	31 37	17 18				
	2423	+ 20 39	N		3 6 77	+1 51	8 28	N		15 23 99	+1 52	25 51	17 23				
	2362	+ 16 21	S		6 54 41 93	+1 94	43 87	S		7 6 59 49	+1 50	60 99	12 17 12	12 17 123	+ 0 010	− 0 254	12 16 879
	2373	+ 3 18	S		56 11 13	+3 12	14 25	S		8 29 98	+1 42	31 40	17 15				
	2398	+ 16 44	S		59 25 02	+1 90	26 92	S		11 42 51	+1 51	44 02	17 10				
	2455	+ 21 45	N	s Q − 1 70	7 8 3 11	−1 99	1 12	N	s Q − 1 71	7 20 20 22	−1 89	18 33	12 17 21	12 17 178	+ 0 010	− 0 254	12 16 934
	2460	+ 21 40	N		8 55 51	−1 99	53 52	N		21 12 57	−1 89	10 68	17 16				
	2469	+ 28 8	N		10 42 20	−2 68	39 52	N		22 58 48	−1 85	56 63	17 11				
	2472	+ 28 8	N		11 33 26	−2 68	30 58	N		23 49 66	−1 85	47 81	17 23				
	2444	+ 11 53	S		7 6 33 01	−1 05	31 96	S		7 18 51 01	−1 95	49 06	12 17 10	12 17 190	+ 0 010	− 0 254	12 16 946
	2487	+ 3 31	S		15 5 99	−0 30	5 69	S		27 24 99	−2 00	22 99	17 30				
	2491	+ 3 36	S		16 9 97	−0 30	9 67	S		28 28 84	−2 00	26 84	17 17				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL − ρ

WALTAIR (E) *Lat 17° 43′ Long 5h 33m 26s*; AND BOLARUM (W) *Lat 17° 30′, Long 5h 14m 16s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $B_E - C_E = -0^s\ 262$, $B_S - C_S = -0\ 262$	ΔL − ρ
1892					h m s	s	s			h m s	s	s	m s				
Jan 18	2343	+ 2 2	N	*I P W*	7 5 7 75	+0 37	8 12	N	*I P E*	7 24 18 11	+1 61	19 72	19 11 60	m s 19 11 618	− 0 043	− 0 262	19 11 313
	2350	+ 24 1[illegible]		d c + 1 1	6 18 [illegible]4	+0 79	19 53	N	d c + 1 0	25 29 59	+1 60	31 19	11 66				
	2410	+ 22 11	N	b − 2 1 a + 318 8	14 6 23	+1 07	7 30	N	b − 3 3 a − 2 2	33 17 32	+1 59	18 91	11 61				
	2423	+ 20 3[illegible]	N	s Q + 1 70	16 0 14	+1 30	1 44	N	s Q + 1 65	35 11 45	+1 59	•13 04	11 60				
	2362	+ 16 21	S		7 7 35 18	+1 87	37 05	S		7 26 47 05	+1 59	48 64	19 11 59	m s 19 11 640	− 0 043	− 0 262	19 11 335
	2373	+ 3 18	S		9 3 92	+3 46	7 38	S		28 17 46	+1 59	19 05	11 67				
	2382	+ 0 2	S		10 10 74	3 85	14 59	S		29 24 69	+1 59	26 28	11 69				
	2398	+ 16 44	S		12 18 28	+1 81	20 09	S		31 30 11	+1 59	31 70	11 61				
	2455	+ 21 45	N	s Q − 1 65	7 20 56 43	−2 21	54 22	N	s Q − 1 65	7 40 7 60	−1 71	5 89	19 11 67	m s 19 11 635	− 0 043	− 0 262	19 11 370
	2460	21 40	N		21 48 8[illegible]	−2 21	46 68	N		40 60 04	−1 71	58 33	11 65				
	2469	+ 28 8	N		23 35 8[illegible]	−3 14	32 71	N		42 45 97	−1 69	44 28	11 5[illegible]				
	2472	+ 28 8	N		24 26 93	−3 14	23 79	N		43 37 13	−1 69	35 44	11 65				
	2444	+ 11 53	S		7 19 26 04	−0 94	25 10	S		7 38 38 48	−1 71	36 77	19 11 67	m s 19 11 680	− 0 043	− 0 262	19 11 375
	2480	+ 2 [illegible]			26 56 02	+0 23	56 25	S		46 9 60	−1 71	7 89	11 64				
	2487	+ 3 3	S		27 58 80	+0 07	58 87	S		47 12 27	−1 71	10 56	11 69				
	2491	+ 3 3[illegible]	S		29 2 72	+0 07	2 79	S		48 16 22	−1 71	14 51	11 72				
Jan 19	2343	+ 27 2	N	*I P E*	7 5 9 64	+1 64	11 28	N	*I P E*	7 24 21 39	+1 61	23 00	19 11 72	m s 19 11 690	− 0 045	− 0 262	19 11 383
	2350	+ 24 19	N	d c − 2 9	6 21 15	+1 61	22 76	N	d c + 1 0	25 32 80	+1 61	34 41	11 65				
	2410	+ 22 11	N	b − 3 2 a − 21 3	14 8 93	+1 59	10 52	N	b − 3 2 a + 10 7	33 20 53	+1 62	22 15	11 63				
	2423	+ 20 39	N	s Q + 1 70	16 2 99	+1 58	4 57	N	s Q + 1 70	35 14 70	+1 63	16 33	11 76				
	2362	+ 16 21	S		7 7 38 65	+1 55	40 20	S		7 26 50 20	+1 66	51 86	19 11 66	m s 19 11 743	− 0 045	− 0 262	19 11 436
	2373	+ 3 18	S		9 9 04	+1 45	10 49	S		28 20 55	+1 71	22 26	11 77				
	2382	+ 0 2	S		10 16 31	+1 43	17 74	S		29 27 83	+1 72	29 55	11 81				
	2398	+ 16 44	S		12 21 72	+1 55	23 27	S		31 33 35	+1 65	35 00	11 73				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

WALTAIR (E) *Lat* 17° 48 *Long* $5^h\ 33^m\ 26^s$; AND BOLARUM (W) *Lat* 17° 30′, *Long* $5^h\ 14^m\ 15^s$

Astronomical Date	Star		Transits Observed at E — *By Burrard with Telescope No 1*					Transits Observed at W — *By Lenox Conyngham with Telescope No 2*					Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns for Persl Equations $B_E - C_E = -0^s\ 262$, $B_W - C_W = -0\ 262$	$\Delta L - \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1892		°			h m s	s	s			h m s	s	s	m s				
Jan 19	2455	+ 21 45	N	I P E	7 20 59 19	− 1 76	57 43	N	I P E	7 40 10 82	− 1 78	9 04	19 11 61	m s 19 11 703	− 0 045	− 0 262	19 11 396
	2460	+ 21 40	N	d c − 2 9	21 51 64	− 1 76	49 88	N	d c + 1 0	41 3 40	− 1 78	1 62	11 74				
	2469	+ 28 8	N	b − 3 2 a − 21 3	23 37 38	− 1 70	35 88	N	b − 3 2 a + 10 7	42 49 41	− 1 80	47 61	11 73				
	2472	+ 28 8	N	Q − 1 65 s	24 28 66	− 1 70	26 96	N	Q − 1 70 s	43 40 49	− 1 80	38 69	11 73				
	2444	+ 11 53	S		7 19 30 15	− 1 84	28 31	S		7 38 41 75	− 1 73	40 02	19 11 71	m s 19 11 680	− 0 045	− 0 262	19 11 373
	2480	+ 2 9	S		26 61 37	− 1 91	59 46	S		46 12 83	− 1 69	11 14	11 68				
	2487	+ 3 31	S		28 3 99	− 1 90	2 09	S		47 15 50	− 1 69	13 81	11 72				
	2491	+ 3 36	S		29 7 90	− 1 80	6 10	S		48 19 40	− 1 69	17 71	11 61				
Jan 20	2343	+ 27 2	N	I P E	7 5 13 17	+ 1 38	14 71	N	I P W	7 24 25 16	+ 1 39	26 55	19 11 80	m s 19 11 770	− 0 044	− 0 262	19 11 464
	2350	+ 24 19	N	d c − 2 9	6 24 64	+ 1 57	26 21	N	d c − 2 8	25 36 53	+ 1 42	37 95	11 74				
	2410	+ 22 11	N	b − 3 4 a − 13 2	14 12 39	+ 1 56	13 95	N	b − 4 2 a + 21 6	33 24 25	+ 1 44	25 69	11 74				
	2423	+ 20 39	N	Q + 1 68 s	16 6 53	+ 1 55	8 08	N	Q + 1 65 s	35 18 43	+ 1 45	19 88	11 80				
	2362	+ 16 21	S		7 7 42 16	+ 1 52	43 68	S		7 26 54 00	+ 1 49	55 49	19 11 81	m s 19 11 790	− 0 044	− 0 262	19 11 484
	2378	+ 8 18	S		9 12 51	+ 1 48	13 99	S		28 24 12	+ 1 62	25 74	11 75				
	2398	+ 16 44	S		12 25 17	+ 1 52	26 69	S		31 37 01	+ 1 49	38 50	11 81				
	2455	+ 21 45	N	Q − 1 68 s	7 21 2 72	− 1 81	0 91	N	Q − 1 65 s	7 40 14 58	− 1 86	12 72	19 11 81	m s 19 11 805	− 0 044	− 0 262	19 11 499
	2460	+ 21 40	N		21 55 14	− 1 81	53 33	N		41 6 93	− 1 86	5 07	11 74				
	2469	+ 28 8	N		23 41 12	− 1 78	39 34	N		42 53 07	− 1 93	51 14	11 80				
	2472	+ 28 8	N		24 32 26	− 1 78	30 48	N		43 44 28	− 1 93	42 35	11 87				
	2444	+ 11 53	S		7 19 33 57	− 1 86	31 71	S		7 38 45 27	− 1 76	43 51	19 11 80	m s 19 11 788	− 0 044	− 0 262	19 11 482
	2480	+ 2 9	S		27 4 80	− 1 89	2 91	S		46 16 40	− 1 67	14 73	11 82				
	2487	+ 3 31	S		28 7 40	− 1 88	5 52	S		47 18 96	− 1 68	17 28	11 76				
	2491	+ 3 36	S		29 11 34	− 1 88	9 46	S		48 22 91	− 1 68	21 23	11 77				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$.

WALTAIR (E) *Lat* 17° 43′ *Long* 5h 33m 26s; AND BOLARUM (W) *Lat* 17° 30′, *Long* 5h 14m 15s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox-Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns. for Persl. Equations $B_W - C_E = -0.262$, $B_B - C_B = -0.262$	$\Delta L - \rho$
1892		° ′			h m s	s	s			h m s	s	s	m s				
Jan 21	2343	+ 27 2	N	I P W	7 5 16 24	+ 1 70	17 94	N	I P W	7 24 28 29	+ 1 34	29 63	19 11 69	m s 19 11 693	− 0 042	− 0 262	19 11 389
	2350	+ 24 19	N	d c + 1 1	6 27 76	+ 1 69	29 45	N	d c − 2 8	25 39 67	+ 1 39	41 06	11 61				
	2410	+ 22 11	N	b − 2 4 a − 6 6	14 15 48	+ 1 68	17 16	N	b − 4 7 a + 31 8	33 27 45	+ 1 42	28 87	11 71				
	2423	+ 20 39	N	s Q + 1 70	16 9 57	+ 1 68	11 25	N	s Q + 1 66	35 21 57	+ 1 44	33 01	11 76				
	2362	+ 16 21	S		7 7 45 15	+ 1 67	46 82	S		7 26 57 05	+ 1 50	58 55	19 11 73	m s 19 11 713	− 0 042	− 0 262	19 11 409
	2373	+ 3 18	S		9 15 49	+ 1 63	17 12	S		28 27 24	+ 1 67	28 91	11 79				
	2382	+ 0 2	S		10 22 85	+ 1 63	24 48	S		29 34 43	+ 1 71	36 14	11 66				
	2398	+ 16 44	S		12 28 25	+ 1 67	29 92	S		31 40 10	+ 1 49	41 59	11 67				
	2455	+ 21 45	N	s Q − 1 70	7 21 5 74	− 1 72	4 02	N	s Q − 1 66	7 40 17 64	− 1 90	15 74	19 11 72	m s 19 11 730	− 0 042	− 0 262	19 11 426
	2469	+ 28 8	N		23 44 20	− 1 70	42 50	N		42 56 24	− 2 00	54 24	11 74				
	2444	+ 11 53	S		7 19 36 64	− 1 74	34 90	S		7 38 48 41	− 1 76	46 65	19 11 75	m s 19 11 775	− 0 042	− 0 262	19 11 471
	2491	+ 3 36	S		29 14 35	− 1 77	12 58	S		48 26 03	− 1 65	24 38	11 80				
Jan. 22	2343	+ 27 2	N	I P W d c + 1 1 b − 3 7 a + 3 3 s Q + 1 70	7 5 19 53	+ 1 63	21 16	N	I P E d c + 1 0 b − 0 8 a − 8 6 s Q + 1 67	7 24 31 07	+ 1 72	32 79	19 11 63	m s 19 11 630	− 0 042	− 0 262	19 11 326
	2362	+ 16 21	S		7 7 48 36	+ 1 64	50 00	S		7 27 0 00	+ 1 67	1 67	19 11 67	m s 19 11 700	− 0 042	− 0 262	19 11 396
	2373	+ 3 18	S		9 18 70	+ 1 66	20 36	S		28 30 40	+ 1 62	32 02	11 66				
	2382	+ 0 2	S		10 25 88	+ 1 66	27 54	S		29 37 67	+ 1 61	39 28	11 74				
	2398	+ 16 44	S		12 31 38	+ 1 64	33 02	S		31 43 08	+ 1 67	44 75	11 73				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

WALTAIR (E) *Lat 17° 43′ Long 5h 33m 26* AND BOLARUM (W) *Lat 17° 30′, Long 5h 14m 15*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $B_N - C_N = -0\ 262$, $B_S - C_S = -0\ 262$	$\Delta L - \rho$
1892					h m s	s	s			h m s	s	s	m s				
Jan 22	2405	+ 21 45	N	*I P W*	7 21 8 91	−1 77	7 14	N	*I P E*	7 40 20 56	−1 65	18 91	19 11 77	m s 19 11 ,53	− 0 042	− 0 262	19 11 449
	2460	+ 21 40	N	d c + 1 1	21 61 35	−1 77	59 58	N	d c + 1 0	41 12 96	−1 65	11 31	11 73				
	2469	+ 28 8	N	b − 3 7 a + 3 3	23 47 39	−1 78	45 61	N	b − 0 8 a − 8 6	42 58 99	−1 62	57 37	11 ,6				
	2472	+ 28 8	N	s Q − 1 70	24 38 53	−1 78	36 75	N	s Q − 1 67	43 50 12	−1 62	48 50	11 75				
	2444	+ 11 53	S		7 19 39 73	−1 74	37 99	S		7 38 51 47	−1 69	49 ,8	19 11 79	m s 19 11 7,8	− 0 042	− 0 262	19 11 474
	2480	+ 2 9	S		27 10 83	−1 74	9 09	S		46 22 61	−1 72	20 89	11 80				
	2487	+ 3 31	S		28 13 53	−1 74	11 79	S		47 25 25	−1 72	23 53	11 74				
	2491	+ 3 36	S		29 17 44	−1 74	15 70	S		48 29 20	−1 72	27 48	11 78				
Jan 23	2343	+ 27 2	N	*I P E*	7 5 22 ,5	+1 55	24 30	N	*I P E*	7 24 34 26	+1 77	36 03	19 11 73	m s 19 11 ,3	− 0 043	− 0 262	19 11 4,8
	2350	+ 24 19	N	d c − 2 9	6 34 11	+1 54	35 65	N	d c + 1 0	25 45 66	+1 76	4, 42	11 ,7				
	2410	+ 22 11	N	b − 4 9 a −10 0	14 21 85	+1 53	23 38	N	b 0 0 a + 0 2	33 33 41	+1 ,6	35 17	11 79				
				s Q + 1 70					s Q + 1 74								
	2378	+ 3 18	S		7 9 21 99	+1 49	23 48	S		7 28 33 51	+1 ,6	35 2,	19 11 79	m s 19 11 ,90	− 0 043	− 0 262	19 11 485
	2469	+ 28 8	N	s Q − 1 70	7 23 50 61	−1 84	48 ,7	N	s Q − 1 84	7 43 2 29	−1 81	0 48	19 11 ,1	m s 19 11 ,40	− 0 043	− 0 262	19 11 435
	2472	+ 28 8	N		24 41 69	−1 84	39 85	N		43 53 43	−1 81	51 62	11 77				
	2491	+ 3 36	S		7 29 20 76	−1 93	18 83	S		7 48 32 46	−1 82	30 64	19 11 81	m s 19 11 810	− 0 043	− 0 262	19 11 598

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

WALTAIR (E) *Lat 17° 43′ Long 5h 33m 26s* AND BOLARUM (W) *Lat 17° 30′, Long 5h 14m 15s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham, with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $B_W - C_W = -0^s 262$, $B_E - C_E = -0\ 262$	ΔL + ρ
1892					h m s	s	s			h m s	s	s	m s				
Jan 18	2657	+ 25 41	N	*I P W*	7 35 4 99	0 61	5 60	N	*I P E*	, 54 15 73	+1 60	17 33	19 11 73	m s 19 11 ,90	− 0 002	− 0 263	19 11 526
	2714	+ 21 54	N	d c + 1 1	42 5 18	+1 12	6 30	N	d c + 1 0	8 1 16 49	+1 59	18 08	11 78				
	2734	+ 32 48	N	b − 2 1 a + 318 8	45 34 ,8	−0 51	34 27	N	b − 3 3 a − 2 2	4 44 51	+1 62	46 13	11 86				
				Q + 1 71					Q + 1 65								
	2668	− 1 5	S		7 36 21 35	+3 99	25 34	S		7 55 35 53	+1 58	37 11	19 11 77	m s 19 11 818	− 0 002	− 0 262	19 11 5 4
	2679	+ 10 15	S		37 59 48	+2 65	62 13	S		5, 12 31	+1 59	13 90	11 77				
	2690	+ 13 26	S		39 42 96	+2 23	45 19	S		58 55 47	+1 59	5, 06	11 8,				
	2725	− 2 40	S		43 4, 46	+4 18	51 64	S		8 3 1 92	+1 58	3 50	11 86				
	2786	+ 27 34	N	Q − 1 71	7 54 15 48	−3 10	12 38	N	Q − 1 65	8 13 25 60	−1 69	23 91	19 11 53	m s 19 11 583	− 0 002	− 0 262	19 11 319
	2799	+ 18 41	N		57 54 69	−1 86	52 83	N		17 6 18	−1 71	4 47	11 64				
	2833	+ 24 30	N		8 2 57 29	−2 66	54 63	N		22 7 91	−1 ,0	6 21	11 58				
	2814	− 3 24	S		7 59 53 01	+0 85	53 86	S		8 19 7 24	−1 72	5 52	19 11 66	m s 19 11 660	− 0 002	− 0 262	19 11 396
Jan 19	2657	+ 25 41	N	*I P E*	7 35 4 02	+1 62	5 64	N	*I P E*	7 54 15 96	+1 60	17 56	19 11 92	m s 19 11 893	− 0 002	− 0 262	19 11 629
	2734	+ 32 48	N	d c − 2 9	45 32 73	+1 69	34 42	N	d c + 1 0	8 4 44 77	+1 58	46 35	11 93				
	2744	+ 17 59	N	b − 3 2 a − 21 3	46 41 34	+1 57	42 91	N	b − 3 2 a + 10 7	5 53 10	+1 64	54 74	11 83				
				Q + 1 70					Q + 1 ,0								
	2668	− 1 5	S		7 36 23 96	+1 42	25 38	S		7 55 35 56	+1 73	37 29	19 11 91	m s 19 11 913	− 0 002	− 0 262	19 11 649
	2679	+ 10 15	S		38 0 72	+1 50	2 22	S		57 12 42	+1 68	14 10	11 88				
	2725	− 2 40	S		43 50 24	+1 40	51 64	S		8 3 1 86	+1 73	3 59	11 95				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$.

WALTAIR (E) *Lat* 17° 43′ *Long* 5h 33m 26s; AND BOLARUM (W) *Lat* 17° 30′, *Long* 5h 14m 15s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $B_E - C_E = -0\ 262$, $B_S - C_S = -0\ 262$	$\Delta L + \rho$
					h m s	s	s			h m s	s	s	m s				
1892 Jan 10	2759	+ 18 0	N	I P E	7 48 43 83	− 1 82	42 01	N	I P E	8 7 55 64	− 1 76	53 88	19 11 87	m s 19 11 918	− 0 002	− 0 262	19 11 654
	2786	+ 27 34	N	d c − 2 9 b − 3 2 a − 21 3	54 13 82	− 1 76	12 06	N	d c + 1 0 b − 3 2 a + 10 ,	13 25 82	− 1 80	24 02	11 96				
	2799	+ 18 41	N		57 54 39	− 1 84	52 55	N		17 6 27	− 1 77	4 50	11 95				
	2833	+ 24 30	N	Q − 1 70 s	8 2,56 18	− 1 79	54 39	N	Q − 1 70 s	22 8 07	− 1 79	6 28	11 89				
	2778	+ 9 31	S		7 51 23 13	− 1 91	21 22	S		8 10 34 85	− 1 72	33 13	19 11 91	m s 19 11 890	− 0 002	− 0 262	19 11 626
	2782	+ 9 12	S		56 24 40	− 1 91	22 49	S		11 36 05	− 1 71	34 34	11 85				
	2814	− 3 24	S		59 55 69	− 2 00	53 69	S		19 7 24	− 1 66	5 58	11 89				
	2825	− 3 33	S		8 0 59 55	− 2 00	57 55	S		20 11 12	− 1 66	9 46	11 91				
Jan 20	2657	+ 25 41	N	I P E	7 35 4 13	+ 1 57	5 70	N	I P W	7 54 16 36	+ 1 40	17 76	19 12 06	m s 19 12 045	− 0 003	− 0 262	19 11 ,80
	2744	+ 17 59	N	d c − 2 9 b − 3 4 a − 13 2 Q + 1 68 s	46 41 41	+ 1 54	42 95	N	d c − 2 8 b − 4 2 a + 21 6 Q + 1 65 s	8 5 53 50	+ 1 48	54 98	12 03				
	2668	− 1 5	S		7 36 24 14	+ 1 45	25 59	S		7 55 35 85	+ 1 65	37 50	19 11 91	m s 19 12 013	− 0 003	− 0 262	19 11 748
	2679	+ 10 15	S		38 0 66	+ 1 49	2 15	S		5, 12 68	+ 1 56	14 24	12 09				
	2690	+ 13 26	S		39 43 74	+ 1 51	45 25	S		58 55 81	+ 1 52	57 33	12 08				
	2725	− 2 40	S		43 50 31	+ 1 45	51 76	S		8 3 2 06	+ 1 67	3 73	11 97				
	2759	+ 18 0	N	Q − 1 68 s	7 48 43 8,	− 1 81	42 06	N	Q − 1 65 s	8 7 55 88	− 1 82	54 06	19 12 00	m s 19 11 993	− 0 003	− 0 262	19 11 728
	2799	+ 18 41	N		57 54 51	− 1 82	52 69	N		17 6 51	− 1 83	4 68	11 99				
	2833	+ 24 30	N		8 2 56 35	− 1 79	54 56	N		22 8 43	− 1 88	6 55	11 99				
	2778	+ 9 31	S		7 51 23 25	− 1 87	21 38	S		8 10 35 03	− 1 73	33 30	19 11 92	m s 19 11 910	− 0 003	− 0 262	19 11 645
	2814	− 3 24	S		59 55 72	− 1 92	53 80	S		19 7 33	− 1 63	5 70	11 90				
	2825	− 3 33	S		8 0 59 61	− 1 92	57 69	S		20 11 23	− 1 63	9 60	11 91				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

WALTAIR (E) *Lat 17° 43′ Long 5h 33m 26s* AND BOLARUM (W) *Lat 17° 30′, Long 5h 14m 15s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By *Burrard* with *Telescope No 1*): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By *Lenox Conyngham* with *Telescope No 2*): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns. for Persl. Equations $B_N - C_N = -0^s.262$ $B_S - C_S = -0.262$	$\Delta L + \rho$
1892					h m s	s	s			h m s	s	s	m s				
Jan 21	2714	+ 21 54	N	*I P W*	7 42 5 13	+ 1 68	6 81	N	*I P W*	8 1 17 31	+ 1 42	18 73	19 11 92	m s 19 11 877	− 0 003	− 0 262	19 11 612
	2734	+ 32 48	N	d c + 1 1	45 33 18	+ 1 72	34 90	N	d c − 2 8	4 45 51	+ 1 25	46 76	11 86				
	2744	+ 17 59	N	b − 2 4 a − 6 6	46 41 68	+ 1 68	43 36	N	b − 4 a + 31 8	5 53 74	+ 1 47	55 21	11 85				
				s Q + 1 70					s Q + 1 66								
	2690	+ 13 26	S		7 39 44 17	+ 1 67	45 84	S		7 58 56 11	+ 1 54	57 65	19 11 81	m s 19 11 845	− 0 003	− 0 262	19 11 580
	2725	− 2 40	S		43 50 51	+ 1 62	52 13	S		8 3 2 27	+ 1 74	4 01	11 88				
	2759	+ 18 0	N	s Q − 1 70	7 48 44 11	− 1 72	42 39	N	s Q − 1 66	8 7 56 20	− 1 85	54 35	19 11 96	m s 19 11 948	− 0 003	− 0 262	19 11 683
	2786	+ 27 34	N		54 14 31	− 1 70	12 61	N		13 26 54	− 1 99	24 55	11 94				
	2799	+ 18 41	N		57 54 77	− 1 73	53 04	N		17 6 80	− 1 86	4 94	11 90				
	2833	+ 24 30	N		8 2 56 58	− 1 71	54 87	N		22 8 80	− 1 94	6 86	11 99				
	2778	+ 9 31	S		7 51 23 35	− 1 75	21 60	S		8 10 35 35	− 1 73	33 62	19 12 02	m s 19 11 963	− 0 003	− 0 262	19 11 698
	2782	+ 9 12	S		52 24 71	− 1 75	22 96	S		11 36 58	− 1 73	34 85	11 89				
	2814	− 3 24	S		59 55 92	− 1 78	54 14	S		19 7 63	− 1 57	6 06	11 92				
	2825	− 3 33	S		8 0 59 77	− 1 78	57 99	S		20 11 58	− 1 57	10 01	12 02				
Jan 22	2657	+ 25 41	N	*I P W*	7 35 4 70	+ 1 58	6 28	N	*I P E*	7 54 16 42	+ 1 70	18 12	19 11 84	m s 19 11 830	− 0 003	− 0 262	19 11 565
	2734	+ 32 48	N	d c + 1 1	45 33 39	+ 1 56	34 95	N	d c + 1 0	8 4 45 10	+ 1 74	46 84	11 89				
	2744	+ 17 59	N	b − 3 7 a + 3 3	46 41 97	+ 1 59	43 56	N	b − 0 8 a − 8 6	5 53 65	+ 1 67	55 32	11 76				
				s Q + 1 65					s Q + 1 67								
	2668	− 1 5	S		7 36 24 38	+ 1 61	25 99	S		7 55 36 24	+ 1 61	37 85	19 11 86	m s 19 11 883	− 0 003	− 0 262	19 11 618
	2679	+ 10 15	S		38 1 18	+ 1 61	2 79	S		57 13 02	+ 1 65	14 67	11 88				
	2690	+ 13 26	S		39 44 29	+ 1 61	45 90	S		58 56 13	+ 1 66	5 79	11 89				
	2725	− 2 40	S		43 50 65	+ 1 62	52 27	S		8 3 2 57	+ 1 60	4 17	11 90				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

WALTAIR (E) *Lat* 17° 43′, *Long* 5ʰ 33ᵐ 26ˢ; AND BOLARUM (W) *Lat* 17° 30′, *Long* 5ʰ 14ᵐ 15ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $B_N - C_N = - 0^s\ 262$; $B_S - C_S = - 0\ 262$	$\Delta L + \rho$
1892					h m s	s	s			h m s	s	s	m s	m s			
Jan 22	2786	+ 27 34	N	*I P W*	7 54 14 47	− 1 72	12 75	N	*I P E*	8 13 26 26	− 1 62	24 64	19 11 89	19 11 913	− 0 003	− 0 262	19 11 648
	2799	+ 18 41	N	d c + 1 1	57 54 94	− 1 71	53 23	N	d c + 1 0	17 6 78	− 1 67	5 11	11 88				
	2833	+ 24 30	N	b − 3 7 a + 3 3	8 2 56 74	− 1 72	55 02	N	b − 0 8 a − 8 6	22 8 63	− 1 64	6 99	11 97				
				Q − 1ˢ 65					Q − 1ˢ 67								
	2778	+ 9 31	S		7 51 23 57	− 1 70	21 87	S		8 10 35 44	− 1 70	33 74	19 11 87	19 11 897	− 0 003	− 0 262	19 11 632
	2814	− 3 24	S		59 55 99	− 1 68	54 31	S		19 8 00	− 1 74	6 26	11 95				
	2825	− 3 33	S		8 0 59 87	− 1 68	58 19	S		20 11 80	− 1 74	10 06	11 87				
Jan 23	2657	+ 25 41	N	*I P E*	7 35 4 99	+ 1 54	6 53	N	*I P E*	7 54 16 65	+ 1 76	18 41	19 11 88	19 11 955	− 0 003	− 0 262	19 11 690
	2714	+ 21 54	N	d c − 2 9 b − 4 9 a − 10 0	42 5 56	+ 1 53	7 09	N	d c + 1 0 b 0 0 a + 0 2	8 1 17 36	+ 1 76	19 12	12 03				
				Q + 1ˢ 70					Q + 1ˢ 74								
	2668	− 1 5	S		7 36 24 74	+ 1 47	26 21	S		7 55 36 36	+ 1 76	38 12	19 11 91	19 11 940	− 0 003	− 0 262	19 11 675
	2679	+ 10 15	S		38 1 51	+ 1 49	3 00	S		57 13 18	+ 1 76	14 94	11 94				
	2690	+ 13 26	S		39 44 68	+ 1 50	46 18	S		58 56 33	+ 1 76	58 09	11 91				
	2725	− 2 40	S		43 51 02	+ 1 46	52 48	S		8 3 2 72	+ 1 76	4 48	12 00				
	2786	+ 27 34	N	Q − 1ˢ 70	7 54 14 85	− 1 85	13 00	N	Q − 1ˢ 74	8 13 26 66	− 1 71	24 95	19 11 95	19 11 980	− 0 003	− 0 262	19 11 715
	2799	+ 18 41	N		57 55 34	− 1 89	53 45	N		17 7 16	− 1 72	5 44	11 99				
	2833	+ 24 30	N		8 2 57 13	− 1 86	55 27	N		22 8 99	− 1 72	7 27	12 00				
	2814	− 3 24	S		7 59 56 49	− 1 94	54 55	S		8 19 8 15	− 1 72	6 43	19 11 88	19 11 950	− 0 003	− 0 262	19 11 685
	2825	− 33	S		8 0 60 25	− 1 94	58 31	S		20 12 05	− 1 72	10 33	12 02				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

BOLARUM (E) *Lat 17° 30′, Long 5h 14m 13s* AND BOMBAY (W) *Lat 18° 54, Long 4h 51m 25s*

Astronomical Date	Star		Transits Observed at E *By Lenox Conyngham, with Telescope No 2*					Transits Observed at W *By Burrard with Telescope No 1*					Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns for Persl Equations $C_N - B_N = +0^s 262$, $C_S - B_S = +0\ 262$	$\Delta L - \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1892					h m s	s	s			h m s	s	s	m s				
Feb 9	2410	+ 22 11	N	*I P E*	7 13 43 70	+1 68	45 38	N	*I P E*	7 36 32 19	+1 70	33 89	22 48 51	m s 22 48 430	− 0 006	+ 0 262	22 48 686
	2416	+ 36 58	N	d c + 0 9	14 53 93	+0 91	54 84	N	d c − 1 1	37 41 19	+2 08	43 27	48 43				
	2429	+ 40 53	N	b + 6 1	16 44 31	+0 66	44 97	N	b − 4 4	39 31 16	+2 21	33 37	48 40				
	2440	+ 27 51	N	a + 107 5 s Q + 1 73	17 53 97	+1 41	55 38	N	a − 54 2 s Q + 1 76	40 41 93	+1 83	43 76	48 38				
	2398	+ 16 44	S		7 11 56 26	+1 92	58 18	S		7 34 45 07	+1 58	46 65	22 48 47	m s 22 48 385	− 0 006	+ 0 262	22 48 641
	2444	+ 11 53	S		19 1 09	+2 13	3 22	S		41 50 08	+1 48	51 56	48 34				
	2451	+ 9 29	S		19 47 53	+2 23	49 76	S		42 36 65	+1 44	38 09	48 33				
	2462	+ 8 30	S		21 20 41	+2 27	22 68	S		44 9 66	+1 42	11 08	48 40				
	2499	+ 20 24	N	s Q − 1 73	7 30 51 31	−1 69	49 62	N	s Q + 1 76	7 53 36 24	+1 65	37 89	22 48 27	m s 22 48 313	− 0 006	+ 0 262	22 48 569
	2509	+ 34 50	N		32 14 64	−2 42	12 22	N		54 58 53	+2 02	60 55	48 33				
	2017	+ 32 16	N		33 7 10	−2 28	4 82	N		55 51 21	+1 95	53 16	48 34				
	2491	+ 3 36	S		7 28 41 93	−1 00	40 93	S		7 51 27 96	+1 32	29 28	22 48 35	m s 22 48 330	− 0 006	+ 0 262	22 48 586
	2526	+ 5 29	S		34 28 95	−1 07	27 88	S		57 14 83	+1 36	16 19	48 31				
Feb 10	2410	+ 22 11	N	*I P W*	7 13 43 99	+1 70	45 69	N	*I P E*	7 36 32 51	+1 75	34 26	22 48 57	m s 22 48 540	− 0 007	+ 0 262	22 48 795
	2416	+ 36 58	N	d c − 2 7	14 52 99	+2 12	55 11	N	d c − 1 1	37 41 46	+2 19	43 65	48 54				
	2429	+ 40 53	N	b − 2 1	16 43 00	+2 26	45 26	N	b − 1 1	39 31 50	+2 33	33 83	48 57				
	2440	+ 27 51	N	a − 59 7 s Q + 1 70	17 53 80	+1 85	55 65	N	a − 59 2 s Q + 1 73	40 42 23	+1 90	44 13	48 48				
	2398	+ 16 44	S		7 11 56 92	+1 57	58 49	S		7 34 45 36	+1 62	46 98	22 48 49	m s 22 48 485	− 0 007	+ 0 262	22 48 740
	2444	+ 11 53	S		19 2 07	+1 46	3 53	S		41 50 47	+1 51	51 98	48 45				
	2451	+ 9 29	S		19 48 64	+1 40	50 04	S		42 37 02	+1 47	38 49	48 45				
	2462	+ 8 30	S		21 21 59	+1 38	22 97	S		44 10 07	+1 45	11 52	48 55				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

BOLARUM (E) *Lat* 17° 30′, *Long* 5h 14m 15 AND BOMBAY (W) *Lat* 18° 54 *Long* 4h 51m 25s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Pers1 Equations $C_E - B_E = +0^s\ 262$, $C_W - B_W = +0\ 262$	$\Delta L - \rho$
1892					h m s	s	s			h m s	s	s	m s				
Feb 10	2472	+ 28 8	N	I P W	7 24 3 78	− 1 54	2 24	N	I P E	7 46 48 80	+ 1 91	50 71	22 48 47	m s 22 48 445	− 0 007	+ 0 262	22 48 700
	2499	+ 20 24	N	d c − 2 7	30 51 69	− 1 74	49 95	N	d c − 1 1	53 36 67	+ 1 71	38 38	48 43				
	2509	+ 34 50	N	b − 2 1, a − 59 7	32 13 85	− 1 34	12 51	N	b − 1 1, a − 59 2	54 58 87	+ 2 11	60 98	48 47				
	2517	+ 32 16	N	s Q − 1 70	33 6 58	− 1 41	5 17	N	s Q + 1 73	55 51 55	+ 2 03	53 58	48 41				
	2480	+ 2 9	S		7 26 36 84	− 2 16	34 68	S		7 49 21 86	+ 1 31	23 17	22 48 49	m s 19 48 443	− 0 007	+ 0 262	22 48 698
	2487	+ 3 31	S		27 39 49	− 2 13	37 36	S		50 24 44	+ 1 34	25 78	48 42				
	2491	+ 3 36	S		28 43 44	− 2 13	41 31	S		51 28 40	+ 1 34	29 74	[illegible]				
	2526	+ 5 29	S		34 30 30	− 2 09	28 21	S		57 15 26	+ 1 38	16 64	48 43				
Feb 11	2410	+ 22 11	N	I P W	7 13 44 60	+ 1 70	46 30	N	I P W	7 36 33 14	+ 1 75	34 89	22 48 59	m s 22 48 510	− 0 006	+ 0 262	22 48 766
	2416	+ 36 58	N	d c − 2 7	14 53 61	+ 2 12	55 73	N	d c − 0 7	37 4 12	+ 2 13	44 25	48 52				
	2429	+ 40 53	N	b − 1 9, a − 59 0	16 43 60	+ 2 27	45 87	N	b − 2 6, a − 54 4	39 32 12	+ 2 26	34 38	48 51				
	2440	+ 27 51	N	s Q + 1 70	17 54 42	+ 1 85	56 27	N	s Q + 1 75	40 42 82	+ 1 87	44 69	48 42				
	2398	+ 16 44	S		7 11 57 51	+ 1 58	59 09	S		7 34 46 16	+ 1 62	47 78	22 48 69	m s 22 48 515	− 0 006	+ 0 262	22 48 771
	2444	+ 11 53	S		19 2 65	+ 1 47	4 12	S		41 51 05	+ 1 52	52 57	48 45				
	2451	+ 9 29	S		19 49 22	+ 1 41	50 63	S		42 37 57	+ 1 47	39 04	48 41				
	3464	+ 8 30	S		21 22 15	+ 1 39	23 54	S		44 10 60	+ 1 45	12 05	48 51				
	2472	+ 28 8	N	s Q − 1 70	7 24 4 36	− 1 54	2 82	N	s Q + 1 75	7 46 49 34	+ 1 88	51 22	22 48 40	m s 22 48 420	− 0 006	+ 0 262	22 48 676
	2499	+ 20 24	N		30 52 24	− 1 74	50 50	N		53 37 20	+ 1 70	38 90	48 40				
	2500	+ 34 50	N		32 14 44	− 1 34	13 10	N		54 59 54	+ 2 07	61 61	48 51				
	2517	+ 32 16	N		33 7 15	− 1 42	5 73	N		55 52 11	+ 1 99	54 10	48 37				
	2480	+ 2 9	S		7 26 37 39	− 2 15	35 24	S		7 49 22 32	+ 1 32	23 64	22 48 40	m s 22 48 438	− 0 006	+ 0 262	22 48 694
	2487	+ 3 31	S		27 39 95	− 2 12	37 83	S		50 24 95	+ 1 35	26 30	48 47				
	2491	+ 3 36	S		28 43 97	− 2 12	41 85	S		51 28 91	+ 1 35	30 26	48 41				
	2526	+ 5 29	S		34 30 79	− 2 08	28 71	S		57 15 79	+ 1 39	17 18	48 47				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

BOLARUM (E) *Lat 17° 30′ Long 5ʰ 14ᵐ 15* **: AND BOMBAY (W)** *Lat 18° 54′, Long 4ʰ 51ᵐ 25ˢ*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $C_N - B_N = + 0^s 262$, $C_S - B_S = + 0 262$	$\Delta L - \rho$
1892					h m s	s	s			h m s	s	s	m s				
Feb 12	2410	+ 22 11	N	*I P E*	7 13 44 60	+1 84	46 44	N	*I P W*	7 36 33 29	+1 75	35 04	22 48 60	m s 22 48 448	− 0 002	+ 0 262	22 48 ,08
	2416	+ 36 58	N	d c + 0 9	14 53 74	+2 25	55 99	N	d c − 0 7	37 42 22	+2 15	44 37	48 38				
	2429	+ 40 53	N	b 0 0 a −54 6	16 43 70	+2 38	46 08	N	b − 1 3 a −55 7	31 32 22	+2 29	34 51	48 43				
	2440	+ 27 51	N	s Q + 1 71	17 54 48	+1 98	56 46	N	s Q + 1 75	40 42 95	+1 89	44 84	48 38				
	2398	+ 16 44	S		7 11 57 55	+1 71	59 26	S		7 34 46 08	+1 63	47 71	22 48 45	m s 22 48 408	− 0 002	+ 0 262	22 48 668
	2444	+ 11 53	S		19 2 72	+1 61	4 33	S		41 51 14	+1 52	52 66	48 33				
	2451	+ 9 29	S		19 49 22	+1 56	50 ,8	S		42 3 75	+1 4,	39 22	48 44				
	2462	+ 8 30	S		21 22 20	+1 54	23 74	S		44 10 70	+1 45	12 15	48 41				
Feb 13	2429	+ 40 53	N	*I P E*	7 16 43 86	+2 34	46 20	N	*I P E*	7 39 35 86	−1 26	34 60	22 48 40	m s 22 48 380	− 0 003	+ 0 262	22 48 639
	2440	+ 27 51	N	d c + 0 9 b − 0 3 a −52 8 s Q + 1 70	17 54 62	+1 95	56 57	N	d c − 1 1 b − 4 2 a −58 1 s Q − 1 ,5	40 46 59	−1 66	44 93	48 36				
	2444	+ 11 53	S		7 19 2 81	+1 59	4 40	S		7 41 54 88	−2 04	52 84	22 48 44	m s 22 48 440	− 0 003	+ 0 262	22 48 699
	2472	+ 28 8	N	s Q − 1 70	7 24 4 54	−1 44	3 10	N	s Q − 1 75	7 46 53 08	−1 65	51 43	22 48 33	m s 22 48 130	− 0 003	+ 0 262	22 48 589
	2499	+ 20 24	N		30 52 45	−1 63	50 82	N		53 41 01	−1 85	39 16	48 34				
	2509	+ 34 50	N		32 14 69	−1 26	13 43	N		55 3 19	−1 45	1 ,4	48 31				
	2517	+ 32 16	N		33 7 38	−1 33	6 05	N		55 55 93	−1 54	54 39	48 34				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

BOLARUM (E) *Lat 17° 30′, Long 6ʰ 14ᵐ 15ˢ* AND BOMBAY (W) *Lat 18° 54′, Long 4ʰ 51ᵐ 25*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Pers Equations $C_E - B_E = + 0^s 262$, $C_B - B_B = + 0 262$	$\Delta L - \rho$
1892					h m s	s	s			h m s	s	s	m s	m s			
Feb 13	2480	+ 2 9	S	*I P E*	7 26 37 58	− 2 00	35 58	S	*I P E*	7 49 26 16	− 2 24	23 92	22 48 34	22 48 368	− 0 003	+ 0 262	22 48 627
	2487	+ 3 31	S	d: c + 0 9	27 40 21	− 1 98	38 23	S	d: c − 1 1	50 28 78	− 2 20	6 58	48 35				
	2491	+ 3 36	S	b − 0 3, a − 52 8	28 44 14	− 1 98	42 16	S	b − 4 2, c − 58 1	51 32 73	− 2 20	30 53	48 37				
	2526	+ 5 29	S	Q − 1 70 s	34 30 98	− 1 94	29 04	S	Q − 1 75 s	57 19 61	− 2 16	17 45	48 41				
Feb 14	2410	+ 22 11	N	*I P W*	7 13 45 18	+ 1 59	46 77	N	*I P E*	7 36 33 67	+ 1 70	35 37	22 48 60	22 48 443	− 0 004	+ 0 262	22 48 701
	2416	+ 36 58	N	d: c − 0 5	14 54 38	+ 1 97	56 35	N	d: c − 1 1	37 42 56	+ 2 14	44 70	48 35				
	2420	+ 40 53	N	b + 0 9, a − 50 9	16 44 32	+ 2 09	46 41	N	b − 3 8, a − 60 5	39 32 58	+ 2 28	34 86	48 45				
	2440	+ 27 51	N	Q + 1 48 s	17 55 11	+ 1 72	56 83	N	Q + 1 74 s	40 43 35	+ 1 85	45 20	48 37				
	2398	+ 16 44	S		7 11 58 18	+ 1 47	59 65	S		7 34 46 49	+ 1 57	48 06	22 48 41	22 48 413	− 0 004	+ 0 262	22 48 671
	2444	+ 11 53	S		19 3 31	+ 1 38	4 69	S		41 51 59	+ 1 45	53 04	48 35				
	2451	+ 9 29	S		19 49 82	+ 1 33	51 15	S		42 38 19	+ 1 41	39 60	48 45				
	2462	+ 8 30	S		21 22 82	+ 1 31	24 13	S		44 11 18	+ 1 39	12 57	48 44				
	2472	+ 28 8	N	Q − 1 48 s	7 24 4 63	− 1 23	3 40	N	Q + 1 74 s	7 46 49 91	+ 1 86	51 77	22 48 37	22 48 425	− 0 004	+ 0 262	22 48 683
	2499	+ 20 24	N		30 52 49	− 1 41	51 08	N		53 31 84	+ 1 66	39 50	48 42				
	2509	+ 34 50	N		32 14 67	− 1 06	13 61	N		55 0 05	+ 2 06	2 11	48 50				
	2517	+ 32 16	N		33 7 41	− 1 12	6 29	N		55 52 72	+ 1 98	54 70	48 41				
	2480	+ 2 9	S		7 26 37 58	− 1 77	35 81	S		7 49 23 01	+ 1 25	24 26	22 48 45	22 48 418	− 0 004	+ 0 262	22 48 676
	2487	+ 3 31	S		27 40 14	− 1 74	38 40	S		50 25 56	+ 1 28	26 84	48 44				
	2491	+ 3 36	S		28 44 14	− 1 74	42 40	S		51 29 50	+ 1 28	30 78	48 38				
	2526	+ 5 29	S		34 31 03	− 1 71	29 32	S		57 16 39	+ 1 33	17 72	48 40				

TABLE V OBSERVATIONS OF TRANSITS WITH W CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

BOLARUM (E) *Lat* 17° 30′ *Long* 5h 14m 15 AND BOMBAY (W) *Lat* 18° 54′ *Long* 4h 51m 25s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham with Telescope No 2): Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By Burrard with Telescope No 1): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	(W − E): Mean of Group	Correction for Rate of W Clock	Corrns. for Persl Equations $C_W - B_W = + 0^s 262$, $C_E - B_E = + 0\ 262$	$\Delta L + \rho$
1892					h m s	s	s			h m s	s	s	m s				
Feb 9	2714	+ 21 54	N	I P E	7 38 15 24	+ 1 70	16 94	N	I P E	8 1 7 39	− 1 83	5 56	22 48 62	m s = 22 48 5 8	− 0 052	+ 0 262	22 48 788
	2734	+ 32 48	N	d c + 0 9	41 43 87	+ 1 16	45 03	N	d c − 1 1	4 35 13	− 1 55	33 58	48 55				
	2744	+ 17 59	N	b + 6 1 a + 107 5	42 51 60	+ 1 87	53 47	N	b − 4 4 a − 54 2	5 43 99	− 1 91	42 08	48 61				
	2759	+ 18 0	N	s Q + 1 73	44 50 82	+ 1 87	52 69	N	s Q − 1 76	7 43 13	− 1 91	41 22	48 53				
	2690	+ 13 26	S		7 35 53 81	+ 2 06	55 87	S		7 58 46 47	− 2 01	44 46	22 48 59	m s = 22 48 568	− 0 052	+ 0 262	22 48 778
	2725	− 2 40	S		39 59 58	+ 2 71	62 29	S		8 2 53 22	− 2 31	50 91	48 62				
	2778	+ 9 31	S		47 29 68	+ 2 23	31 91	S		10 22 56	− 2 08	20 48	48 57				
	2782	+ 9 12	S		48 30 96	+ 2 24	33 20	S		11 23 78	− 2 09	21 69	48 49				
	2786	+ 27 34	N	s Q − 1 73	7 50 24 86	− 2 03	22 83	N	s Q − 1 76	8 13 12 99	− 1 69	11 30	22 48 47	m s = 22 48 545	− 0 052	+ 0 262	22 48 755
	2793	+ 43 32	N		52 22 41	− 2 99	19 42	N		15 9 22	− 1 21	8 01	48 59				
	2833	+ 24 30	N		59 7 10	− 1 88	5 22	N		21 55 56	− 1 77	53 79	48 57				
	2850	+ 24 27	N		8 1 61 86	− 1 88	59 98	N		24 50 30	− 1 77	48 53	48 55				
	2799	+ 18 41	S		7 54 4 96	− 1 62	3 34	S		8 16 53 72	− 1 90	51 82	22 48 48	m s = 22 48 498	− 0 052	+ 0 262	22 48 708
	2814	− 3 24	S		56 5 16	− 0 72	4 44	S		18 55 33	− 2 33	53 00	48 56				
	2825	− 3 33	S		57 9 07	− 0 72	8 35	S		19 59 19	− 2 34	56 85	48 50				
	2867	+ 10 26	S		8 3 41 05	− 1 27	39 78	S		26 30 30	− 2 07	28 23	48 45				
Feb 10	2714	+ 21 54	N	I P W	7 38 18 47	+ 1 69	20 16	N	I P E	8 1 10 59	− 1 71	8 88	22 48 72	m s = 22 48 698	− 0 049	+ 0 262	22 48 911
	2734	+ 32 48	N	d c − 2 7	41 46 25	+ 2 00	48 25	N	d c − 1 1	4 38 33	− 1 41	36 92	48 67				
	2744	+ 17 59	N	b − 2 1 a − 59 7	42 55 08	+ 1 60	56 68	N	b − 1 1 a − 59 2	5 47 23	− 1 81	45 42	48 74				
	2759	+ 18 0	N	s Q + 1 70	44 54 26	+ 1 60	55 86	N	s Q − 1 73	7 46 33	− 1 81	44 52	48 66				
	2725	− 2 40	S		7 40 4 37	+ 1 14	5 51	S		8 2 56 48	− 2 26	54 22	22 48 71	m s = 22 48 683	− 0 049	+ 0 262	22 48 896
	2778	+ 9 31	S		41 33 76	+ 1 40	35 16	S		10 25 84	− 1 99	23 85	48 69				
	2782	+ 9 12	S		48 34 99	+ 1 39	36 38	S		11 27 02	− 1 99	25 03	48 65				

OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL + ρ

BOLARUM (E) *Lat 17° 30′ Long 5h 14m 15s* AND BOMBAY (W) *Lat 18° 54′, Long 4h 51m 25s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, By Lenox Conyngham with Telescope No 2: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, By Burrard with Telescope No 1: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $C_N - B_N = +0^s.262$, $C_S - B_S = +0.262$	ΔL + ρ
1892		° ′			h m s	s	s			h m s	s	s	m s				
Feb 10	2786	+ 27 34	N	I P W	7 50 27 59	−1 56	26 03	N	I P E	8 13 16 26	−1 57	14 69	22 48 66	m s 22 48 620	− 0 049	+ 0 262	22 48 833
	2793	+ 43 32	N	d c − 2 7	52 23 65	−1 03	22 62	N	d c − 1 1	15 12 31	−1 03	11 28	48 66				
	2833	+ 24 30	N	b − 2 1 a −59 7	59 10 03	−1 64	8 39	N	b − 1 1 a −59 2	21 58 63	−1 65	56 98	48 59				
	2850	+ 24 27	N	Q − 1 70 s	8 2 4 88	−1 64	3 24	N	Q − 1 73 s	24 53 46	−1 65	51 81	48 57				
	2799	+ 18 41	S		7 54 8 30	−1 78	6 52	S		8 16 56 92	−1 80	55 12	22 48 60	m s 22 48 623	− 0 049	+ 0 262	22 48 836
	2814	− 3 24	S		56 9 88	−2 28	7 60	S		18 58 55	−2 27	56 28	48 68				
	2825	− 3 33	S		57 13 80	−2 28	11 52	S		20 2 44	−2 28	0 16	48 64				
	2867	+ 10 26	S		8 3 44 93	−1 98	42 95	S		26 33 50	−1 98	31 52	48 57				
Feb 11	2734	+ 32 48	N	I P W	7 41 49 17	+1 99	51 16	N	I P W	8 4 41 43	−1 49	39 94	22 48 78	m s 22 48 730	− 0 045	+ 0 262	22 48 947
	2744	+ 17 59	N	d c − 2 7 b − 1 9 a −59 0 Q + 1 70 s	42 58 01	+1 61	59 62	N	d c − 0 7 b − 2 6 a −54 4 Q − 1 75 s	5 50 15	−1 85	48 30	48 68				
	2690	+ 13 26	S		7 36 0 58	+1 51	2 09	S		7 58 52 65	−1 95	50 ,0	22 48 61	m s 22 48 660	− 0 045	+ 0 262	22 48 877
	2725	− 2 40	S		40 7 29	+1 15	8 44	S		8 2 59 37	−2 27	57 10	48 66				
	2778	+ 9 31	S		47 36 61	+1 41	38 02	S		10 28 ,9	−2 03	36 ,6	48 74				
	2782	+ 9 12	S		48 37 91	+1 41	39 32	S		11 29 99	−2 04	2, 95	48 63				
	2786	+ 27 34	N	Q − 1 70 s	7 50 30 48	−1 56	28 92	N	Q − 1 75 s	8 13 19 27	−1 62	17 65	22 48 73	m s 22 48 695	− 0 045	+ 0 262	22 48 912
	2793	+ 43 32	N		52 26 52	−1 03	25 49	N		15 15 31	−1 14	14 17	48 68				
	2833	+ 24 30	N		59 12 96	−1 64	11 32	\		22 1 ,5	−1 70	0 05	48 ,3				
	2850	+ 24 27	N		8 2 7 78	−1 64	6 14	N		24 56 48	−1 70	54 78	48 64				
	2,99	+ 18 41	S		7 54 11 21	−1 77	9 44	S		8 16 59 90	−1 84	58 06	22 48 62	m s 22 48 630	− 0 045	+ 0 262	22 48 847
	2814	− 3 24	S		56 12 82	−2 27	10 55	S		18 61 51	−2 28	59 23	48 68				
	2867	+ 10 26	S		8 3 47 83	−1 97	45 86	S		26 36 46	−2 01	34 45	48 59				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

BOLARUM (E) *Lat* $17^\circ 30'$ *Long* $5^h 14^m 15^s$; AND BOMBAY (W) *Lat* $18^\circ 54'$, *Long* $4^h 51^m 25^s$

Astronomical Date	Star		Transits Observed at E — *By Lenox Conyngham, with Telescope No 2*					Transits Observed at W — *By Burrard, with Telescope No 1*					Difference of Corrected Times (W − E)		Correction for Rate of W Clock	Corrns. for Persl. Equations $C_W - B_W = +0^s.262$; $C_E - B_E = +0.262$	$\Delta L + \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1892					h m s	s	s			h m s	s	s	m s				
Feb 12	2714	+ 21 54	N	*I P E*	7 38 24 09	+1 83	25 92	N	*I P W*	8 1 16 31	−1 76	14 55	22 48 63	m s 22 48 683	− 0 043	+ 0 262	22 48 902
	2734	+ 32 48	N	d c + 0 9	41 51 80	+2 11	53 91	N	d c − 0 7	4 44 06	−1 47	42 59	48 68				
	2744	+ 17 59	N	b 0 0 a −54 6	43 0 64	+1 74	2 38	N	b − 2 3 a −55 7	5 53 00	−1 84	51 16	48 ,8				
	2759	+ 18 0	N	s Q + 1 71	44 59 86	+1 74	61 60	N	s Q − 1 75	7 52 08	−1 84	50 24	48 64				
	2690	+ 13 26	S		7 36 3 16	+1 64	4 80	S		7 58 55 45	−1 94	53 51	22 48 71	m s 22 48 727	− 0 043	+ 0 262	22 48 946
	2725	− 2 40	S		40 9 89	+1 31	11 20	S		8 2 62 17	−2 28	59 89	48 69				
	2778	+ 9 31	S		47 39 24	+1 56	40 80	S		10 31 61	−2 03	29 58	48 78				
	2793	+ 43 32	N	s Q − 1 71	7 52 29 23	−0 94	28 29	N	s Q − 1 75	8 15 18 07	−1 11	16 96	22 48 6,	m s 22 48 637	− 0 043	+ 0 262	22 48 856
	2833	+ 24 30	N		59 15 62	−1 53	14 09	N		22 4 39	−1 70	2 69	48 60				
	2850	+ 24 27	N		8 2 10 40	−1 53	8 87	N		24 59 21	−1 70	57 51	48 64				
	2799	+ 18 41	S		7 54 13 86	−1 66	12 20	S		8 17 2 59	−1 83	0 76	22 48 56	m s 22 48 58	− 0 043	+ 0 262	22 48 80,
	2814	− 3 24	S		56 15 45	−2 13	13 32	S		19 4 22	−2 29	1 93	48 61				
	2825	− 3 33	S		57 19 32	−2 13	17 19	S		20 8 10	−2 30	5 80	48 61				
	2867	+ 10 26	S		8 3 50 49	−1 84	48 65	S		26 39 23	−2 01	37 22	48 57				
Feb 13	2714	+ 21 54	N	*I P E*	7 38 26 70	+1 81	28 51	N	*I P E*	8 1 15 44	+1 70	17 14	22 48 63	m s 22 48 630	− 0 040	+ 0 262	22 48 852
	2734	+ 32 48	N	d c + 0 9	41 54 49	+2 08	56 57	N	d c − 1 1	4 43 22	+1 98	45 20	48 63				
	2744	+ 17 59	N	b − 0 3 a −52 8	43 3 33	+1 72	5 05	N	b − 4 2 a −58 1	5 52 12	+1 60	53 72	48 67				
	2759	+ 18 0	N	s Q + 1 70	45 2 46	+1 ,2	4 18	N	s Q + 1 75	7 51 17	+1 60	52 77	48 59				
	2690	+ 13 26	S		7 36 5 75	+1 63	7 38	S		7 58 54 51	+1 49	56 00	22 48 62	m s 22 48 653	− 0 040	+ 0 262	22 48 87,
	2725	− 2 40	S		40 12 50	+1 30	13 80	S		8 3 1 31	+1 16	2 47	48 67				
	2778	+ 9 31	S		47 41 89	+1 54	43 43	S		10 30 62	+1 43	32 05	48 62				
	2782	+ 9 12	S		48 43 07	+1 54	44 61	S		11 31 89	+1 42	33 31	48 70				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

BOLARUM (E) *Lat* 17° 30′ *Long* 5h 14m 15s; AND BOMBAY (W) *Lat* 18° 54′, *Long* 4h 51m 25s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $C_W - B_W = +0^s.262$, $C_E - B_E = +0.262$	$\Delta L + \rho$
1892					h m s	s	s			h m s	s	s	m s				
Feb 13	2786	+ 27 34	N	I P E	7 50 35 80	− 1 46	34 34	N	I P E	8 13 21 10	+ 1 84	22 94	22 48 60				
	2793	+ 43 32	N	d c + 0 9	52 31 94	− 0 96	30 98	N	d c − 1 1	15 17 20	+ 2 35	19 55	48 57	m s 22 48 548	− 0 040	+ 0 262	22 48 770
	2833	+ 24 30	N	b − 0 3 a − 52 8	59 18 31	− 1 53	16 78	N	b − 4 2 a − 58 1	22 3 48	+ 1 76	5 24	48 46				
	2850	+ 24 27	N	s Q − 1 70	8 2 13 10	− 1 53	11 57	N	s Q + 1 75	24 58 37	+ 1 76	60 13	48 56				
	2709	+ 18 41	S		7 54 16 47	− 1 66	14 81	S		8 17 1 86	+ 1 61	3 47	22 48 66				
	2814	− 3 24	S		56 18 10	− 2 11	15 99	S		19 3 45	+ 1 15	4 60	48 61	m s 22 48 618	− 0 040	+ 0 262	22 48 840
	2825	− 3 33	S		57 21 98	− 2 11	19 87	S		20 7 28	+ 1 14	8 42	48 55				
	2867	+ 10 26	S		8 3 53 07	− 1 84	51 23	S		26 38 45	+ 1 43	39 88	48 65				
Feb 14	2714	+ 21 54	N	I P W	7 38 29 39	+ 1 53	30 92	N	I P E	8 1 21 34	− 1 78	19 56	22 48 64				
	2734	+ 32 48	N	d c − 2 7	41 57 25	+ 1 79	59 04	N	d c − 1 1	4 49 13	− 1 48	47 65	48 61	m s 22 48 648	− 0 038	+ 0 262	22 48 872
	2744	+ 17 59	N	b + 0 9 a − 50 9	43 6 02	+ 1 45	7 47	N	b − 3 8 a − 60 5	5 58 04	− 1 88	56 16	48 69				
	2750	+ 18 0	N	s Q + 1 48	45 5 18	+ 1 45	6 63	N	s Q − 1 74	7 57 16	− 1 88	55 28	48 65				
	2690	+ 13 26	S		7 36 8 47	+ 1 36	9 83	S		7 58 60 48	− 1 99	58 49	22 48 66				
	2725	− 2 40	S		40 15 27	+ 1 05	16 32	S		8 3 7 26	− 2 34	4 92	48 60	m s 22 48 633	− 0 038	+ 0 262	22 48 857
	2778	+ 9 31	S		47 44 60	+ 1 28	45 88	S		10 36 55	− 2 07	34 48	48 60				
	2782	+ 9 12	S		48 45 84	+ 1 27	47 11	S		11 37 86	− 2 08	35 78	48 67				
	2786	+ 27 34	N	s Q − 1 48	7 50 38 07	− 1 31	36 76	N	s Q − 1 74	8 13 27 02	− 1 63	25 39	22 48 63				
	2793	+ 43 32	N		52 34 20	− 0 84	33 36	N		15 23 13	− 1 10	22 03	48 67	m s 22 48 635	− 0 038	+ 0 262	22 48 859
	2833	+ 24 30	N		59 20 48	− 1 38	19 10	N		22 9 43	− 1 71	7 72	48 62				
	2850	+ 24 27	N		8 2 15 28	− 1 38	13 90	N		25 4 23	− 1 71	2 52	48 62				
	2709	+ 18 41	S		7 54 18 71	− 1 49	17 22	S		8 17 7 83	− 1 87	5 96	22 48 74				
	2814	− 3 24	S		56 20 30	− 1 93	18 37	S		19 9 36	− 2 35	7 01	48 64	m s 22 48 655	− 0 038	+ 0 262	22 48 879
	2825	− 3 33	S		57 24 14	− 1 93	22 21	S		20 13 24	− 2 36	10 88	48 67				
	2867	+ 10 26	S		8 3 55 33	− 1 66	53 67	S		26 44 31	− 2 07	42 24	48 57				

OF THE APPARENT DIFFERENCE OF LONGITUDES, ΔL —

FYZABAD (E) *Lat* 26° 47′ *Long* 5ʰ 25ᵐ 42ˢ; AND DEHRA DŪN (W) *Lat* 30° 19′, *Long* 5ʰ 12ᵐ 25ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham with Telescope No 2): Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By Burrard with Telescope No 1): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Difference (W − E): Mean of Group	Correction for Rate of E Clock	Corrns. for Persl. Equations $C_E - B_E = +0^s.270$, $C_S - B_S = +0.270$	ΔL − ρ
1892		′			h m s	s	s			h m s	s	s	m s				
Mar 15	3625	+ 36 53	N	*I P E*	10 29 54 28	+ 2 21	56 49	N	*I P W*	10 46 15 34	+ 1 50	16 84	16 20 35	m s 16 20 308	− 0 008	+ 0 270	16 20 570
	3633	+ 34 38	N	d: c + 3 9	31 29 47	+ 2 08	31 55	N	d: c + 0 9	47 50 36	+ 1 47	51 83	20 28				
	3641	+ 38 28	N	b + 3 6; a − 105 7	32 41 ,3	+ 2 30	44 03	N	b + 0 2; a − 19 3	49 2 82	+ 1 52	4 34	20 31				
	3661	+ 32 16	N	s: Q + 1 48	35 53 13	+ 1 94	55 07	N	s: Q + 1 40	52 13 91	+ 1 45	15 36	20 29				
	3650	+ 28 5	S		10 34 7 39	+ 1 73	9 12	S		10 50 27 90	+ 1 41	29 31	16 20 19	m s 16 20 183	− 0 008	+ 0 270	16 20 445
	3671	+ 23 45	S		37 17 80	+ 1 53	19 33	S		53 38 15	+ 1 37	39 52	20 19				
	3684	+ 3 3	S		39 21 38	+ 0 69	22 07	S		55 41 01	+ 1 22	42 23	20 16				
	3693	+ 14 46	S		40 27 51	+ 1 14	28 65	S		56 47 54	+ 1 30	48 84	20 19				
	3728	+ 34 48	N	s: Q − 1 48	10 47 4 09	− 0 87	3 22	N	s: Q + 1 40	11 3 22 11	+ 1 47	23 58	16 20 36	m s 16 20 330	− 0 008	+ 0 270	16 20 592
	3741	+ 34 5	N		49 33 29	− 0 91	32 38	N		5 51 20	+ 1 46	52 66	20 28				
	3757	+ 41 0	N		53 12 63	− 0 49	12 14	N		9 30 97	+ 1 55	32 52	20 38				
	3765	+ 39 48	N		54 34 91	− 0 58	34 33	N		10 53 10	+ 1 53	54 63	20 30				
	3708	+ 11 7	S		10 43 23 31	− 1 97	21 34	S		10 59 41 71	− 0 12*	41 59	16 20 25	m s 16 20 260	− 0 008	+ 0 270	16 20 522
	3720	+ 4 10	S		45 10 86	− 2 24	8 62	S		11 1 27 58	+ 1 23	28 81	20 19				
	3732	− 1 33	S		48 2 59	− 2 44	0 15	S		4 19 25	+ 1 19	20 44	20 29				
	3751	+ 26 5	S		50 30 84	− 1 32	29 52	S		6 48 44	+ 1 39	49 83	20 31				
Mar 16	3625	+ 36 53	N	*I P W*	10 29 55 64	+ 1 64	57 28	N	*I P W*	10 46 16 04	+ 1 57	17 61	16 20 33	m s 16 20 335	− 0 010	+ 0 270	16 20 595
	3633	+ 34 38	N	d: c − 5 5	31 30 71	+ 1 57	32 28	N	d: c + 2 9	47 51 04	+ 1 53	52 57	20 29				
	3641	+ 38 28	N	b + 1 8; a − 62 2	32 43 07	+ 1 69	44 ,6	N	b − 0 1; a − 27 1	49 3 48	+ 1 59	5 07	20 31				
	3661	+ 32 16	N	s: Q + 1 44	35 54 25	+ 1 50	55 75	N	s: Q + 1 40	52 14 66	+ 1 50	16 16	20 41				
	3650	+ 28 5	S		10 34 8 47	+ 1 39	9 86	S		10 50 28 69	+ 1 44	30 13	16 20 27	m s 16 20 283	− 0 010	+ 0 270	16 20 543
	3671	+ 23 45	S		37 18 72	+ 1 27	19 99	S		53 38 88	+ 1 39	40 27	20 28				
	3684	+ 3 3	S		39 21 80	+ 0 80	22 60	S		55 41 77	+ 1 18	42 95	20 35				
	3693	+ 14 46	S		40 28 29	+ 1 05	29 34	S		56 48 27	+ 1 30	49 57	20 23				

* Owing to the irregular rate of the Chronograph the Pen Equation had to be applied graphically on the record before the star signals were read off, and consequently in this case Q = 0 00.

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

FYZABAD (E) *Lat* 26° 47′, *Long* $5^h\ 28^m\ 42^s$; AND DEHRA DŪN (W) *Lat* 30° 19′ *Long* $5^h\ 12^m\ 23^s$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard, with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Persl Equations $C_E - B_E = +0\ 270$, $C_B - B_B = +0\ 270$	$\Delta L - \rho$
1892					h m s	s	s			h m s	s	s	m s				
Mar 16	3728	+ 34 48	N	I P W	10 47 5 30	−1 30	4 00	N	I P W	11 3 22 79	+1 54	24 33	16 20 33	m s 16 20 315	− 0 010	+ 0 2,0	16 20 5,5
	3741	+ 34 5	N	d c − 5 5	49 34 52	−1 33	33 19	N	d c + 2 9	5 51 91	+1 53	53 50	20 31				
	3757	+ 41 0	N	b + 1 8	53 14 09	−1 10	12 99	N	b − 0 1	9 31 61	+1 64	33 25	20 26				
	3765	+ 39 48	N	a − 62 2; s Q − 1 44	54 36 22	−1 15	35 07	N	a − 27 1; s Q + 1 40	10 53 82	+1 61	55 43	20 36				
	3708	+ 11 7	S		10 43 23 97	−1 92	22 05	S		10 59 41 00	+1 27	42 27	16 20 22	m s 16 20 248	− 0 010	+ 0 2,0	16 20 508
	3720	+ 4 10	S		45 11 42	−2 06	9 36	S		11 1 28 38	+1 20	29 58	20 22				
	3732	− 1 33	S		48 3 09	−2 18	0 91	S		4 19 98	+1 14	21 12	20 21				
	3751	+ 26 5	S		50 31 77	−1 56	30 21	S		6 49 13	+1 42	50 55	20 34				
Mar 17	3625	+ 36 53	N	I P W	10 29 56 52	+1 65	58 17	N	I P E	10 46 17 26	+1 44	18 70	16 20 53	m s 16 20 5 3	− 0 013	+ 0 2,0	16 20 810
	3633	+ 34 38	N	d c − 5 5	31 31 58	+1 58	33 16	N	d c + 0 5	47 52 29	+1 43	53 72	20 56				
	3641	+ 38 28	N	b + 1 2	32 43 97	+1 70	45 67	N	b + 0 2	49 4 80	+1 44	6 24	20 57				
	3661	+ 32 16	N	a − 66 3; s Q + 1 45	35 55 21	+1 50	36 71	N	a − 8 0; s Q + 1 39	52 15 84	+1 42	17 26	20 55				
	3650	+ 28 5	S		10 34 9 36	+1 38	10 74	S		10 50 29 84	+1 40	31 24	16 20 50	m s 16 20 458	− 0 013	+ 0 2,0	16 20 715
	3671	+ 23 45	S		37 19 70	+1 26	20 96	S		53 40 03	+1 38	41 41	20 45				
	3684	+ 3 3	S		39 22 92	+0 75	23 67	S		55 42 80	+1 32	44 12	20 45				
	3698	+ 14 46	S		40 29 28	+1 03	30 31	S		56 49 39	+1 35	50 74	20 43				
	3728	+ 34 48	N	s Q − 1 45	10 47 6 21	−1 32	4 89	N	s Q + 1 39	11 3 24 02	+1 43	25 45	16 20 56	m s 16 20 533	− 0 013	+ 0 2,0	16 20 ,90
	3741	+ 34 5	N		49 35 45	−1 34	34 11	N		5 53 16	+1 42	54 58	20 47				
	3757	+ 41 0	N		53 14 85	−1 10	13 75	N		9 32 87	+1 45	34 32	20 57				
	3765	+ 39 48	N		54 37 16	−1 15	36 01	N		10 55 09	+1 45	56 54	20 53				
	3708	+ 11 7	S		10 43 24 96	−1 96	23 00	S		10 59 42 09	+1 34	43 43	16 20 43	m s 16 20 445	− 0 013	+ 0 270	16 20 702
	3720	+ 4 10	S		45 12 41	−2 13	10 28	S		11 1 29 37	+1 32	30 69	20 41				
	3732	− 1 33	S		48 4 08	−2 25	1 83	S		4 21 00	+1 31	22 31	20 48				
	3751	+ 26 5	S		50 32 76	−1 58	31 18	S		6 50 25	+1 39	51 64	20 46				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$.

FYZABAD (E) *Lat 26° 47′ Long 5h 28m 49s* AND DEHRA DŪN (W) *Lat 30° 19′, Long 5h 12m 23s*

Astronomical Date	Star		Transits Observed at E — *By Lenox Conyngham with Telescope No 2*					Transits Observed at W — *By Burrard with Telescope No 1*					Difference of Corrected Times (W − E)		Correction for Rate of E Clock	Corrns. for Persl Equations $C_N - B_N = +0.270$, $C_S - B_S = +0.270$	$\Delta L - \rho$
	B A C Number	Declination	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	By each Star	Mean of Group			
1892		°			h m s	s	s			h m s	s	s	m s				
Mar 18	3625	+ 36 53	N	*I P E*	10 29 57 39	+2 01	59 40	N	*I P E*	10 46 18 45	+1 3,	19 82	16 20 42	m s 16 20 383	− 0 013	+ 0 270	16 20 640
	3633	+ 34 38	N	d c + 3 9	31 32 55	+1 92	34 47	N	d c + 0 5	47 53 42	+1 36	54 78	20 31				
	3641	+ 38 28	N	b + 2 6 a −74 5	32 44 85	+2 07	46 92	N	b − 0 8 a −10 2	49 5 92	+1 38	7 30	20 38				
	3661	+ 32 16	N	s Q + 1 46	35 56 15	+1 82	57 97	N	s Q + 1 35	52 17 04	+1 35	18 39	20 42				
	3650	+ 28 5	S		10 34 10 39	+1 67	12 06	S		10 50 31 00	+1 33	32 33	16 20 27	m s 16 20 298	− 0 013	+ 0 2,0	16 20 555
	3671	+ 23 45	S		37 20 68	+1 52	22 20	S		53 41 21	+1 31	42 52	20 32				
	3684	+ 3 3	S		39 23 98	+0 93	24 91	S		55 44 01	+1 23	45 24	20 33				
	3693	+ 14 46	S		40 30 29	+1 25	31 54	S		56 50 53	+1 28	51 81	20 27				
	3728	+ 34 48	N	s Q − 1 46	10 47 7 09	−1 00	6 09	N	s Q + 1 35	11 3 25 27	+1 3(	26 63	16 20 54	m s 16 20 4 3	− 0 013	+ 0 270	16 20 ,10
	3741	+ 34 5	N		49 36 30	−1 03	35 27	N		5 54 44	+1 36	55 80	20 53				
	3757	+ 41 0	N		53 15 83	−0 73	15 10	N		9 34 09	+1 40	35 49	20 39				
	3765	+ 39 48	N		54 38 10	−0 80	37 30	N		10 56 26	+1 39	57 65	20 35				
	3708	+ 11 7	S		10 43 25 97	−1 77	24 20	S		10 59 43 21	+1 26	44 47	16 20 27	m s 16 20 308	− 0 013	+ 0 270	16 20 565
	3720	+ 4 10	S		45 13 41	−1 97	11 44	S		11 1 30 49	+1 24	31 73	20 29				
	3732	− 1 33	S		48 5 13	−2 11	3 02	S		4 22 17	+1 22	23 39	20 37				
	3751	+ 26 5	S		50 33 71	−1 32	32 39	S		6 51 37	+1 32	52 69	20 30				
Mar 19	3625	+ 36 53	N	*I P E*	10 29 58 60	+1 99	60 59	N	*I P E*	10 46 19 58	+1 40	20 98	16 20 39	m s 16 20 368	− 0 014	+ 0 2,0	16 20 624
	3633	+ 34 38	N	d c + 3 9	31 33 68	+1 91	35 59	N	d c + 0 5	47 54 61	+1 39	56 00	20 41				
	3641	+ 38 28	N	b + 2 9 a −71 9	32 46 16	+2 06	48 22	N	b − 0 9 a −12 4	49 7 00	+1 41	8 41	20 19				
	3661	+ 32 16	N	s Q + 1 45	35 57 25	+1 81	59 06	N	s Q + 1 38	52 18 16	+1 38	19 54	20 48				
	3650	+ 28 5	S		10 34 11 55	+1 66	13 21	S		10 50 32 14	+1 36	33 50	16 20 29	m s 16 20 288	− 0 014	+ 0 270	16 20 544
	3671	+ 23 45	S		37 21 81	+1 53	23 34	S		53 42 32	+1 34	43 66	20 32				
	3684	+ 3 3	S		39 25 14	+0 95	26 09	S		55 45 15	+1 24	46 39	20 30				
	3693	+ 14 46	S		40 31 44	+1 26	32 70	S		56 51 65	+1 29	52 94	20 24				

TABLE V OBSERVATIONS OF TRANSITS WITH E CLOCK, AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L - \rho$

FYZABAD (E) *Lat* 26° 47′ *Long* $5^h\ 28^m\ 42^s$; AND DEHRA DŪN (W) *Lat* 30° 19′, *Long* $5^h\ 12^m\ 28^s$

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of E Clock	Corrns for Pers'l Equations $C_E - B_E = + 0^s 270$, $C_S - B_S = + 0\ 270$	$\Delta L - \rho$
1892		°			h m s	s	s			h m s	s	s	m s	m s			
Mar 19	3728	+ 34 48	N	*I P E*	10 47 8 34	−0 99	7 35	N	*I P E*	11 3 26 24	+1 40	27 64	16 20 29	16 20 290	− 0 014	+ 0 270	16 20 546
	3741	+ 34 5	N	d c + 3 9	49 37 54	−1 02	36 52	N	d c + 0 5	5 55 45	+1 39	56 84	20 32				
	3757	+ 41 0	N	b + 2 9, a −71 9	53 16 99	−0 73	16 26	N	b − 0 9, a −12 4	9 35 12	+1 43	36 55	20 29				
	3765	+ 39 48	N	Q − 1 45 s	54 39 27	−0 79	38 48	N	Q + 1 38 s	10 57 32	+1 42	58 74	20 26				
	3708	+ 11 7	S		10 43 27 24	−1 75	25 49	S		10 59 44 40	+1 28	45 68	16 20 19	16 20 218	− 0 014	+ 0 270	16 20 474
	3720	+ 4 10	S		45 14 70	−1 93	12 77	S		11 1 31 75	+1 25	33 00	20 23				
	3732	− 1 33	S		48 6 39	−2 06	4 33	S		4 23 33	+1 22	24 55	20 22				
	3751	+ 26 5	S		50 34 96	−1 30	33 66	S		6 52 54	+1 35	53 89	20 23				
Mar 20	3625	+ 36 53	N	*I P W*	10 30 0 04	+1 84	1 88	N	*I P W*	10 46 20 99	+1 29	22 28	16 20 40	16 20 450	− 0 014	+ 0 270	16 20 706
	3633	+ 34 38	N	d c − 5 5	31 35 15	+1 72	36 87	N	d c − 2 1	47 56 05	+1 29	57 34	20 47				
	3641	+ 38 28	N	b + 3 1, a −90 3	32 47 41	+1 91	49 32	N	b − 1 5, a − 4 4	49 8 54	+1 30	9 84	20 52				
	3661	+ 32 16	N	Q + 1 46 s	35 58 74	+1 62	60 36	N	Q + 1 38 s	52 19 49	+1 28	20 77	20 41				
	3650	+ 28 5	S		10 34 13 00	+1 45	14 45	S		10 50 33 56	+1 29	34 85	16 20 40	16 20 3 0	− 0 014	+ 0 2,0	16 20 626
	3671	+ 23 45	S		37 23 30	+1 29	24 59	S		53 43 71	+1 28	44 99	20 40				
	3684	+ 3 3	S		39 26 71	+0 59	27 30	S		55 46 42	+1 25	47 67	20 37				
	3698	+ 14 46	S		40 33 01	+0 97	33 98	S		56 53 02	+1 27	54 29	20 31				
	3728	+ 34 48	N	Q − 1 46 s	10 47 9 72	−1 19	8 53	N	Q + 1 38 s	11 3 27 69	+1 29	28 98	16 20 45	16 20 480	− 0 014	+ 0 270	16 20 736
	3741	+ 34 5	N		49 38 91	−1 22	37 69	N		5 56 90	+1 29	58 19	20 50				
	3757	+ 41 0	N		53 18 32	−0 87	17 45	N		9 36 65	+1 30	37 95	20 50				
	3765	+ 39 48	N		54 40 57	−0 94	39 63	N		10 58 80	+1 30	60 10	20 47				
	3708	+ 11 7	S		10 43 28 73	−2 08	26 65	S		10 59 45 75	+1 27	47 02	16 20 37	16 20 375	− 0 014	+ 0 270	16 20 631
	3720	+ 4 10	S		45 16 18	−2 31	13 87	S		11 1 32 95	+1 26	34 21	20 34				
	3732	− 1 33	S		48 7 94	−2 48	5 46	S		4 24 56	+1 25	25 81	20 35				
	3751	+ 26 5	S		50 36 40	−1 55	34 85	S		6 54 01	+1 28	55 29	20 44				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

FYZABAD (E) *Lat* 26° 47′ *Long* 5ʰ 28ᵐ 49ˢ AND DEHRA DŪN (W) *Lat* 30° 19′, *Long* 5ʰ 12ᵐ 28ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham, with Telescope No 2): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W (By Burrard with Telescope No 1): Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl. Equations $C_E - B_E = +0^s\ 270$, $C_S - B_S = +0\ 270$	$\Delta L + \rho$
1892					h m s	s	s			h m s	s	s	m s				
Mar 15	3905	+ 39 56	N	*I P E*	11 6 54 85	+ 2 40	57 25	N	*I P W*	11 23 19 03	− 1 27	17 76	16 20 51	m s 16 20 520	− 0 047	+ 0 270	16 20 743
	3918	+ 43 46	N	d c + 3 9	8 20 00	+ 2 67	22 67	N	d c + 0 9	24 44 41	− 1 22	43 19	20 52				
	3937	+ 28 23	N	b + 3 6 a − 105 7	14 16 98	+ 1 74	18 72	N	b + 0 2 a − 19 3	30 40 59	− 1 39	39 20	20 48				
	3952	+ 44 13	N	s Q + 1 48	16 14 79	+ 2 70	17 49	N	s Q − 1 40	32 39 28	− 1 22	38 06	20 57				
	3919	+ 14 58	S		11 9 50 73	+ 1 14	51 87	S		11 26 13 84	− 1 50	12 34	16 20 47	m s 16 20 480	− 0 047	+ 0 270	16 20 703
	3930	+ 3 40	S		12 30 96	+ 0 71	31 67	S		28 53 72	− 1 57	52 15	20 48				
	3962	+ 1 33	S		18 32 62	+ 0 64	33 26	S		34 55 34	− 1 59	53 75	20 49				
	3981	+ 48 23	N	s Q − 1 48	11 24 3 28	+ 0 07	3 35	N	s Q − 1 40	11 40 24 97	− 1 16	23 81	16 20 46	m s 16 20 538	− 0 047	+ 0 270	16 20 761
	3998	+ 35 32	N		27 47 92	− 0 83	47 09	N		44 8 84	− 1 32	7 52	20 43				
	4010	+ 38 34	N		30 27 96	− 0 65	27 31	N		46 49 20	− 1 28	47 92	20 61				
	4018	+ 41 31	N		31 56 54	− 0 46	56 08	N		48 17 98	− 1 25	16 73	20 65				
	3990	+ 20 49	S		11 26 8 05	− 1 56	6 49	S		11 42 28 50	− 1 46	27 04	16 20 55	m s 16 20 495	− 0 047	+ 0 270	16 20 718
	4027	+ 9 3	S		33 14 24	− 2 04	12 20	S		49 34 22	− 1 54	32 68	20 48				
	4039	+ 4 5	S		36 25 46	− 2 24	23 22	S		52 45 31	− 1 57	43 74	20 52				
	4049	+ 4 15	S		38 8 77	− 2 23	6 54	S		54 28 54	− 1 57	26 97	20 43				
Mar 16	3905	+ 39 56	N	*I P W*	11 6 59 56	+ 1 75	61 31	N	*I P W*	11 23 23 15	− 1 19	21 96	16 20 65	m s 16 20 630	− 0 041	+ 0 270	16 20 859
	3918	+ 43 46	N	d c − 5 5	8 24 80	+ 1 89	26 69	N	d c + 2 9	24 48 50	− 1 11	47 39	20 70				
	3937	+ 28 23	N	b + 1 8 a − 62 2	14 21 44	+ 1 39	22 83	N	b − 0 1 a − 27 1	30 44 72	− 1 35	43 37	20 54				
				s Q + 1 44					s Q − 1 40								
	3886	+ 17 3	S		11 3 43 02	+ 1 10	44 12	S		11 20 6 23	− 1 48	4 75	16 20 63	m s 16 20 548	− 0 041	+ 0 270	16 20 777
	3919	+ 14 58	S		9 54 98	+ 1 05	56 03	S		26 18 02	− 1 50	16 52	20 49				
	3930	+ 3 40	S		12 35 02	+ 0 81	35 83	S		28 57 96	− 1 61	56 35	20 52				
	3962	+ 1 33	S		18 36 63	+ 0 77	37 40	S		34 59 58	− 1 63	57 95	20 55				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$.

FYZABAD (E) *Lat 26° 47′, Long 5^h 28^m 42 ;* AND DEHRA DŪN (W) *Lat 30° 19′ Long 5^h 12^m 23^s*

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E, *By Lenox Conyngham, with Telescope No 2*: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Transits Observed at W, *By Burrard with Telescope No 1*: Star's Aspect	Instrumental Position and Correction Constants	Mean Observed Time	Total Correction	Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $C_W - B_W = + 0^s\ 270$, $C_S - B_S = + 0\ 270$	$\Delta L + \rho$
1892		°			h m s	s	s			h m s	s	s	m s				
Mar 16	3981	+ 48 23	N	I P W	11 24 8 29	−0 80	7 49	N	I P E	11 40 29 11	−1 02	28 09	16 20 60	m s 16 20 637	− 0 041	+ 0 2,0	16 20 866
	3998	+ 35 32	N	d c − 5 5	27 52 46	−1 28	51 18	N	d c + 2 9	44 13 02	−1 25	11 77	20 59				
	4018	+ 41 31	N	b + 1 8 a − 62 2 Q − 1 44 s	32 1 24	−1 08	0 16	N	b − 0 1 a − 27 1 Q − 1 40 s	48 22 03	−1 15	20 88	20 72				
	3990	+ 20 49	S		11 26 12 30	−1 69	10 61	S		11 42 32 67	−1 44	31 23	16 20 62	m s 16 20 553	− 0 041	+ 0 270	16 20 782
	4027	+ 9 3	S		33 18 30	−1 95	16 35	S		49 38 43	−1 55	36 88	20 53				
	4039	+ 4 5	S		36 29 47	−2 06	27 41	S		52 49 55	−1 60	47 95	20 54				
	4049	+ 4 15	S		38 12 65	−2 05	10 60	S		54 32 72	−1 60	31 12	20 52				
Mar 17	3905	+ 39 56	N	I P W	11 7 2 64	+1 76	4 40	N	I P E	11 23 26 41	−1 33	25 08	16 20 68	m s 16 20 610	− 0 034	+ 0 2,0	16 20 846
	3918	+ 43 46	N	d c − 5 5	8 27 98	+1 92	29 90	N	d c + 0 5	24 51 73	−1 30	50 43	20 53				
	3937	+ 28 23	N	b + 1 2 a − 66 3	14 24 52	+1 39	25 91	N	b + 0 2 a − 8 0	30 47 89	−1 38	46 51	20 60				
	3952	+ 44 13	N	Q + 1 45 s	16 22 48	+1 94	24 72	N	Q − 1 39 s	32 46 65	−1 30	45 35	20 63				
	3886	+ 17 3	S		11 3 46 06	+1 08	47 14	S		11 20 9 27	−1 42	7 85	16 20 71	m s 16 20 603	− 0 034	+ 0 270	16 20 839
	3919	+ 14 58	S		9 58 12	+1 03	59 15	S		26 21 06	−1 43	19 63	20 48				
	3930	+ 3 40	S		12 38 11	+0 77	38 88	S		28 60 94	−1 46	59 48	20 60				
	3962	+ 1 33	S		18 39 72	+0 72	40 44	S		35 2 53	−1 47	1 06	20 62				
	3981	+ 48 23	N	Q − 1 45 s	11 24 11 20	−0 78	10 42	N	d c − 13 0	11 40 32 95	−1 74	31 21	16 20 79	m s 16 20 678	− 0 034	+ 0 270	16 20 914
	3998	+ 35 32	N		27 55 55	−1 29	54 26	N	Q − 1 39 s	44 16 57	−1 72	14 85	20 59				
	4010	+ 38 34	N		30 35 77	−1 19	34 58	N		46 56 91	−1 72	55 19	20 61				
	4018	+ 41 31	N		32 4 29	−1 08	3 21	N		48 25 65	−1 72	23 93	20 72				
	3990	+ 20 49	S		11 26 15 38	−1 72	13 66	S		11 42 36 07	−1 73	34 34	16 20 68	m s 16 20 617	− 0 034	+ 0 270	16 20 8,3
	4039	+ 4 5	S		36 32 56	−2 13	30 43	S		52 52 81	−1 76	51 05	20 62				
	4049	+ 4 15	S		38 15 77	−2 12	13 65	S		54 36 02	−1 76	34 26	20 61				

OF THE APPARENT DIFFERENCE OF LONGITUDES, $\Delta L + \rho$

FYZABAD (E) *Lat* 26° 47′ *Long* 5ʰ 28ᵐ 42ˢ AND **DEHRA DŪN** (W) *Lat* 30° 19′, *Long* 5ʰ 12ᵐ 23ˢ

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham, with Telescope No 2): Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By Burrard with Telescope No 1): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	(W − E): Mean of Group	Correction for Rate of W Clock	Corrns for Persl Equations $C_E - B_E = + 0\ 270$, $C_S - B_S = + 0\ 270$	$\Delta L + \rho$
1892					h m s	s	s			h m s	s	s	m s	m s	s	s	m s
Mar 18	3905	+ 39 56	N	*I P E* d c + 3 9 b + 2 6 a − 14 5 s Q + 1 46	11 7 5 31	+ 2 14	7 45	N	*I P E* d c + 0 5 b − 0 8 a − 10 2 s Q − 1 35	11 23 29 30	− 1 31	27 99	16 20 54	16 20 498	− 0 033	+ 0 270	16 20 735
	3913	+ 43 46	N		8 30 54	+ 2 34	32 88	N		24 54 60	− 1 28	53 32	20 44				
	3937	+ 28 23	N		14 27 25	+ 1 68	28 93	N		30 50 80	− 1 37	49 43	20 50				
	3952	+ 44 13	N		16 25 40	+ 2 36	27 76	N		32 49 54	− 1 27	48 27	20 51				
	3886	+ 17 3	S		11 3 48 95	+ 1 31	50 26	S		11 20 12 20	− 1 42	10 78	16 20 52	16 20 513	− 0 033	+ 0 270	16 20 750
	3919	+ 14 58	S		10 0 85	+ 1 25	2 10	S		26 23 99	− 1 42	22 57	20 47				
	3962	+ 1 33	S		18 42 58	+ 0 89	43 47	S		35 5 49	− 1 47	4 02	20 55				
	3981	+ 48 23	N	s Q − 1 46	11 24 13 84	− 0 33	13 51	N	s Q − 1 35	11 40 35 23	− 1 25	33 98	16 20 47	16 20 540	− 0 033	+ 0 270	16 20 777
	3998	+ 35 32	N		27 58 16	− 0 97	57 19	N		44 19 10	− 1 33	17 77	20 58				
	4010	+ 38 34	N		30 8 41	− 0 84	7 57	N		46 59 46	− 1 32	58 14	20 57				
	4018	+ 41 31	N		32 7 06	− 0 69	6 37	N		48 28 21	− 1 30	26 91	20 54				
	3990	+ 20 49	S		11 26 18 19	− 1 50	16 69	S		11 42 38 63	− 1 40	37 23	16 20 54	16 20 520	− 0 033	+ 0 270	16 20 757
	4027	+ 9 3	S		33 24 21	− 1 82	22 39	S		49 44 31	− 1 44	42 87	20 48				
	4039	+ 4 5	S		36 35 3	− 1 97	33 40	S		52 55 37	− 1 46	53 91	20 51				
	4049	+ 4 15	S		38 18 62	− 1 96	16 66	S		54 38 67	− 1 46	37 21	20 55				
Mar 19	3913	+ 43 46	N	*I P F* d c + 3 9 b + 2 9 a − 71 9 s Q + 1 45	11 8 33 37	+ 2 31	35 68	N	*I P E* d c + 0 5 b − 0 9 a − 12 4 s Q − 1 38	11 24 57 48	− 1 30	56 18	16 20 50	16 20 503	− 0 030	+ 0 270	16 20 743
	3937	+ 28 23	N		14 30 11	+ 1 67	31 78	N		30 53 64	− 1 40	52 24	20 46				
	3952	+ 44 13	N		16 28 23	+ 2 34	30 57	N		32 52 42	− 1 30	51 12	20 55				
	3886	+ 17 3	S		11 3 51 74	+ 1 32	53 06	S		11 20 15 03	− 1 46	13 57	16 20 51	16 20 483	− 0 030	+ 0 270	16 20 723
	3919	+ 14 58	S		10 3 68	+ 1 26	4 94	S		26 26 92	− 1 47	25 45	20 51				
	3930	+ 3 40	S		12 43 79	+ 0 97	44 76	S		29 6 72	− 1 52	5 20	20 44				
	3962	+ 1 33	S		18 45 45	+ 0 92	46 37	S		35 8 36	− 1 52	6 84	20 47				

FYZABAD (E) *Lat* 26° 47 *Long* 5h 28m 42s; AND DEHRA DUN (W) *Lat* 30° 19 *Long* 5h 12m 28s

Astronomical Date	Star: B A C Number	Star: Declination	Transits Observed at E (By Lenox Conyngham, with Telescope No 2): Star's Aspect	E: Instrumental Position and Correction Constants	E: Mean Observed Time	E: Total Correction	E: Seconds of Corrected Time	Transits Observed at W (By Burrard, with Telescope No 1): Star's Aspect	W: Instrumental Position and Correction Constants	W: Mean Observed Time	W: Total Correction	W: Seconds of Corrected Time	Difference of Corrected Times (W − E): By each Star	(W − E): Mean of Group	Correction for Rate of W Clock	Corrns for Persl. Equations $C_E - B_E = + 0^s 270$, $C_S - B_S = + 0\ 270$	$\Delta L + \rho$
1892					h m s	s	s			h m s	s	s	m s				
Mar 19	3981	+ 48 23	N	I P E	11 24 16 66	−0 34	16 32	N	I P E	11 40 38 16	−1 26	36 90	16 20 58	m s 16 20 498	− 0 030	+ 0 270	16 20 ,38
	3998	+ 35 32	N	d c + 3 9	28 1 10	−0 96	0 14	N	d c + 0 5	44 21 99	−1 36	20 63	20 49				
	4010	+ 38 34	N	b + 2 9 a −71 9	30 41 33	−0 84	40 49	N	b − 0 9 a −12 4	47 2 35	−1 35	1 00	20 51				
	4018	+ 41 31	N	s Q − 1 45	32 10 00	−0 70	9 30	N	s Q − 1 38	48 31 04	−1 33	29 71	20 41				
	4027	+ 9 3	S		11 32 27 12	−1 80	25 32	S		11 49 47 22	−1 49	45 73	16 20 41	m s 16 20 427	− 0 030	+ 0 270	16 20 667
	4039	+ 4 5	S		36 38 20	−1 93	36 27	S		52 58 29	−1 51	56 78	20 51				
	4049	+ 4 15	S		38 21 52	−1 92	19 60	S		54 41 47	−1 51	39 96	20 36				
Mar 20	3905	+ 39 56	N	I P W	11 7 10 74	+2 00	12 74	N	I P W	11 23 34 72	−1 46	33 26	16 20 52	m s 16 20 513	− 0 027	+ 0 270	16 20 ,56
	3913	+ 43 46	N	d c − 5 5	8 35 99	+2 21	38 20	N	d c − 2 1	24 60 11	−1 47	58 64	20 44				
	3937	+ 28 23	N	b + 3 1 a − 90 3	14 32 78	+1 46	34 24	N	b − 1 5 a − 4 4	30 56 21	−1 49	54 72	20 48				
	3952	+ 44 13	N	s Q + 1 46	16 30 72	+2 23	32 95	N	s Q − 1 38	32 55 03	−1 47	53 56	20 61				
	3886	+ 17 3	S		11 3 54 49	+1 04	55 53	S		11 20 17 48	−1 48	16 00	16 20 47	m s 16 20 498	− 0 027	+ 0 270	16 20 741
	3919	+ 14 58	S		10 6 38	+0 97	7 35	S		26 9 34	−1 49	27 85	20 50				
	3930	+ 3 40	S		12 46 57	+0 61	47 18	S		29 9 16	−1 50	7 66	20 48				
	3962	+ 1 33	S		18 48 19	+0 54	48 73	S		35 10 78	−1 51	9 27	20 54				
	3981	+ 48 23	N	s Q − 1 46	11 24 19 20	−0 43	18 77	N	s Q − 1 38	11 40 40 84	−1 45	39 39	16 20 62	m s 16 20 600	− 0 027	+ 0 270	16 20 843
	4010	+ 38 34	N		30 43 86	−1 00	42 86	N		47 4 89	−1 46	3 43	20 57				
	4018	+ 41 31	N		32 12 46	−0 84	11 62	N		48 33 68	−1 45	32 23	20 61				
	3990	+ 20 49	S		11 26 23 72	−1 75	21 97	S		11 42 44 02	−1 49	42 53	16 20 56	m s 16 20 585	− 0 027	+ 0 270	16 20 828
	4027	+ 9 3	S		33 29 72	−2 13	27 59	S		49 49 66	−1 50	48 16	20 57				
	4039	+ 4 5	S		36 40 92	−2 31	38 61	S		52 60 76	−1 50	59 26	20 65				
	4049	+ 4 15	S		38 24 18	−2 30	21 88	S		54 43 94	−1 50	42 44	20 56				

Arc	Approximate Difference of Longitude	Intervals between Nights of Observations	Rate Corrections for both Clocks deduced from Transits Observed at both Stations, *viz* : α, Corrections for the Intervals between Nights of Observations and β, Hourly Corrections for Nights of Observations interpolated by means of the Quantities α								
			α at E Station for		α at W Station for		Astronomical Dates of Observations	β for		Correction to Observed Difference of Times of Transit for	
			E Clock	W Clock	E Clock	W Clock		E Clock	W Clock	E Clock	W Clock
		1891	s	s	s	s	1891	s	s	s	s
Calcutta (E) and Waltair (W)	$20^m 9^s$	December 6 to 7	− 4 26	+ 0 80	− 4 26	+ 0 73	December 6	− 0 178	+ 0 032	− 0 060	+ 0 011
		7 8	− 4 20	+ 0 65	− 4 12	+ 0 82	, 7	− 175	+ 032	− 059	+ 011
		„ 8 10	− 7 98	+ 1 61	− 7 91	+ 1 62	, 8	− 170	+ 033	− 057	+ 011
		„ 10 , 12	− 6 47	+ 1 79	− 6 44	+ 1 77	„ 9	− 166	+ 034	− 056	+ 011
							„ 10	− 150	+ 035	− 050	+ 012
							, 11	− 135	+ 037	− 045	+ 012
							12	− 135	+ 037	− 045	+ 012
Waltair (E) and Jubbulpore (W)	$13^m 28$	December 18 to 19	− 4 71	− 1 57	− 4 59	− 1 39	December 18	− 0 104	− 0 062	− 0 044	− 0 014
		„ 19 , 20	− 4 80	− 1 12	− 4 73	− 1 06	„ 19	− 196	− 054	− 044	− 012
		, 20 , 21	− 3 33	− 0 98	− 3 50	− 1 23	20	− 170	− 046	− 038	− 010
		, 21 23	− 6 72	− 1 20	− 6 ,4	− 1 12	„ 21	− 142	− 035	− 032	− 008
		23 , 24	− 3 10	− 0 14	− 3 12	− 0 23	, 22	− 140	− 024	− 032	− 005
							„ 23	− 135	− 016	− 030	− 004
							, 24	− 130	− 008	− 029	− 002
		1892					1892				
Waltair (E) and Madras (W)	$12^m 17$	January 6 to 7	− 2 82	+ 1 82	− 2 72	+ 1 92	January 6	− 0 115	+ 0 078	− 0 024	+ 0 016
		7 10	− 9 40	+ 5 24	− 9 33	+ 5 23	„ 7	− 123	+ 075	− 025	+ 015
		„ 10 , 11	− 2 97	+ 1 12	− 3 09	+ 1 16	„ 8	− 130	+ 073	− 027	+ 015
							„ 9	− 130	+ 073	− 027	+ 015
							„ 10	− 128	+ 060	− 026	+ 012
							11	− 126	+ 048	− 026	+ 010
Waltair (E) and Bolarum (W)	$19^m 11$	January 18 to 19	− 3 16	− 0 09	− 3 26	− 0 15	January 18	− 0 134	− 0 005	− 0 043	− 0 002
		„ 19 , 20	− 3 51	− 0 11	− 3 55	− 0 19	„ 19	− 140	− 006	− 045	− 002
		„ 20 „ 21	− 3 15	− 0 39	− 3 11	− 0 30	, 20	− 139	− 010	− 044	− 003
		„ 21 „ 22	− 3 15	− 0 15	− 3 13	− 0 13	„ 21	− 131	− 013	− 042	− 003
		„ 22 „ 23	− 3 11	− 0 20	− 3 25	− 0 27	„ 22	− 132	− 010	− 042	− 003
							„ 23	− 133	− 010	− 043	− 003

Arc	Approximate Difference of Longitude	Intervals between Nights of Observations	Rate Corrections for both Clocks deduced from Transits Observed at both Stations, viz: α, Corrections for the Intervals between Nights of Observations and β Hourly Corrections for Nights of Observations interpolated by means of the Quantities α. α at E Station for E Clock	α at E Station for W Clock	α at W Station for E Clock	α at W Station for W Clock	Astronomical Dates of Observations	β for E Clock	β for W Clock	Correction to Observed Difference of Times of Transit for E Clock	Correction to Observed Difference of Times of Transit for W Clock
		1892	s	s	s	s	1892	s	s	s	s
Bolarum (E) and Bombay (W)	22m 49s	February 9 to 10	− 0 31	− 3 21	− 0 42	− 3 31	February 9	− 0 015	− 0 136	− 0 006	− 0 052
		„ 10 „ 11	− 0 57	− 2 92	− 0 56	− 2 95	„ 10	− 019	− 129	− 007	− 049
		„ 11 , 12	− 0 19	− 2 77	− 0 11	− 2 75	„ 11	− 015	− 119	− 006	− 045
		„ 12 , 13	− 0 12	− 2 64	− 0 13	− 2 59	„ 12	− 006	− 112	− 002	− 043
		„ 13 „ 14	− 0 25	− 2 41	− 0 27	− 2 45	13	− 008	− 105	− 003	− 040
							„ 14	− 011	− 101	− 004	− 038
Fyzabad (E) and Dehra Dun (W)	16m 20s	March 15 to 16	− 0 73	− 4 11	− 0 75	− 4 20	March 15	− 0 031	− 0 1[illegible]3	− 0 008	− 0 047
		„ 16 17	− 0 94	− 3 06	− 1 13	− 3 10	„ 16	− 037	− 151	− 010	− 041
		17 18	− 1 24	− 3 02	− 1 10	− 2 91	17	− 04[illegible]	− 126	− 013	− 034
		„ 18 19	− 1 21	− 2 87	− 1 14	− 2 84	, 18	− 049	− 122	− 013	− 033
		19 20	− 1 20	− 2 40	− 1 33	− 2 46	19	− 051	− 110	− 014	− 030
							, 20	− 053	− 101	− 014	− 027

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL AND THE RETARDATION OF SIGNALS, ρ

CALCUTTA (E) AND WALTAIR (W)

Astronomical Date	Instrumental Position at		Apparent Difference of Longitude by Observations with					
			E Clock = $\Delta L - \rho$			W Clock = $\Delta L + \rho$		
	E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1891			m s	m s	m s	m s	m s	m s
December 6	I P E	I P E	20 9 095	20 9 153	20 9 163	20 9 354	20 9 454	20 9 366
" "		"	9 2[illegible]3	9 130		9 424	9 231	
" 7	I P W	"	9 108	9 126	9 1[illegible]6	9 451		9 438
"	"	"	9 266	9 204		9 414	9 431	
" 8	"	I P W	8 863	9 093	9 067	9 361	9 361	9 361
	"	"	9 133	9 178				
" 10	I P E	"	9 035	8 955	9 023	9 282	9 230	9 219
" "		"	9 088	9 015		9 24[illegible]	9 120	
" 11	I P W	I P E	9 348	9 160	9 196	9 517	9 362	9 401
"	"		9 148	9 128		9 435	9 290	
" 12	"	I P W	8 955	8 973	9 009	9 225		9 260
			9 040	9 068		9 300	9 255	
Means	I P E	I P E	20 9 184	20 9 142	20 9 163	20 9 389	20 9 343	20 9 366
	I P W	"	9 218	9 155	9 186	9 454	9 361	9 417
		I P W	8 998	9 078	9 038	9 295	9 308	9 311
	I P E		9 062	8 985	9 023	9 262	9 176	9 219
General Means			20 9 116	20 9 090	20 9 103	20 9 350	20 9 297	20 9 328

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 20^m + \frac{1}{2}(9^s\ 103 + 9^s\ 328) = 20^m\ 9^s\ 216,$

$$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(9^s\ 328 - 9^s\ 103) = +\ 0^s\ 113$$

The site of the old Longitude Station at Calcutta having been built over a new one was selected The new station is 31 feet $4\frac{1}{2}$ inches east of the old one This distance corresponds to 0^s 022 of longitude, and this quantity must therefore be subtracted from the above value of ΔL before the latter can be compared with arcs previously measured from Calcutta

Final value $= 20^m\ 9^s\ 194$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL AND THE RETARDATION OF SIGNALS, ρ

WALTAIR (E) AND JUBBULPORE (W)								
Astronomical Date	Instrumental Position at		Apparent Difference of Longitude by Observations with					
			E Clock = $\Delta L - \rho$			W Clock = $\Delta L + \rho$		
	E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1891			m s	m s	m s	m s	m s	m s
December 18	*I P W*	*I P E*	13 28 267	13 28 435	13 28 375	13 28 779	13 28 872	13 28 798
" "	"	"	28 382	28 415		28 752	28 790	
" 19	*I P E*	"	28 242	28 257	28 267	28 617	28 601	28 620
" "	"	"	28 297	28 272		28 629	28 634	
" 20	"	*I P W*	28 221	28 271	28 198	28 624	28 589	28 578
" "	"	"	28 148	28 151		28 601	28 496	
" 21	*I P W*	"	28 324		28 367	28 743	28 748	28 805
" "	"	"	28 381	28 397		28 918	28 811	
" 23	"	"	28 339	28 396	28 386	28 732	28 702	28 722
" "	"	"	28 416	28 393		28 745	28 709	
" 24	"	*I P F*		28 422	28 421	28 749	28 754	28 811
" "	"	"	28 465	28 377		28 882	28 857	
Means	*I P E*	*I P E*	13 28 270	13 28 265	13 28 267	13 28 623	13 28 618	13 28 620
	I P W	"	28 371	28 412	28 398	28 791	28 818	28 805
	"	*I P W*	28 365	28 395	28 377	28 785	28 743	28 764
	I P E	"	28 185	28 211	28 198	28 613	28 543	28 578
General Means			13 28 298	13 28 321	13 28 310	13 28 703	13 28 681	13 28 692

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 13^m + \frac{1}{2}(28^s\ 310 + 28^s\ 692) = 13^m\ 28^s\ 501,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(28^s\ 692 - 28^s\ 310) = +\ 0^s\ 191$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL AND THE RETARDATION OF SIGNALS, ρ

WALTAIR (E), AND MADRAS (W)

Astronomical Date		Instrumental Position at		Apparent Difference of Longitude by Observations with					
				E Clock = ΔL − ρ			W Clock = ΔL + ρ		
		E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1892				m s	m s	m s	m s	m s	m s
January	6	*I P W*	*I P E*	12 16 880	12 16 882	12 16 846	12 16 992	12 17 022	12 17 053
"		"		16 787	16 835		17 047	17 152	
"	7	*I P E*		16 701	16 741	16 734	16 869	16 909	16 952
"	"	,	"	16 711	16 784		17 049	16 981	
"	10	,	*I P W*	16 645	16 720	16 690	16 941	16 948	16 957
,		,	,	16 745	16 650		16 941	16 996	
"	11	*I P W*	"	16 848	16 753	16 785	16 926	16 879	16 921
,	,	,	,	16 755	16 783		16 934	16 946	
Means		*I P W*	*I P E*	12 16 834	12 16 859	12 16 846	12 17 020	12 17 087	12 17 053
		I P E	"	16 706	16 763	16 734	16 959	16 945	16 952
		"	*I P W*	16 695	16 685	16 690	16 941	16 972	16 957
		I P W		16 802	16 768	16 785	16 930	16 913	16 921
General Means				12 16 759	12 16 769	12 16 764	12 16 963	12 16 979	12 16 971

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 12^m + \frac{1}{2}(16^s\ 764 + 16^s\ 971) = 12^m\ 16^s\ 868,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(16^s\ 971 - 16^s\ 764) = +\ 0^s\ 104$

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL

AND THE RETARDATION OF SIGNALS, ρ

WALTAIR (E) AND BOLARUM (W)

Astronomical Date		Instrumental Position at		Apparent Difference of Longitude by Observations with					
				E Clock = $\Delta L - \rho$			W Clock = $\Delta L + \rho$		
		E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1892				m s	m s	m s	m s	m s	m s
January	18	*I P W*	*I P E*	19 11 313	19 11 335	19 11 338	19 11 526	19 11 554	19 11 449
"	"	"	"	11 330	11 375		11 319	11 396	
	19	*I P E*	"	11 383	11 436	11 397	11 629	11 649	11 640
"		"	"	11 396	11 373		11 654	11 626	
"	20	"	*I P W*	11 464	11 484	11 482	11 780	11 748	11 725
"	"	"	"	11 499	11 482		11 728	11 645	
"	21	*I P W*	"	11 389	11 409	11 424	11 612	11 580	11 643
"	"	"		11 426	11 471		11 683	11 698	
"	22	"	*I P E*	11 326	11 396	11 411	11 565	11 618	11 616
"			"	11 449	11 474		11 648	11 632	
"	23	*I P E*	"	11 458	11 485	11 471	11 690	11 675	11 691
"	"	"		11 435	11 505		11 715	11 685	
Means		*I P E*	*I P E*	19 11 418	19 11 450	19 11 434	19 11 672	19 11 659	19 11 666
		I P W		11 355	11 395	11 375	11 515	11 550	11 533
		"	*I P W*	11 408	11 440	11 424	11 648	11 639	11 643
		I P E	"	11 482	11 483	11 482	11 754	11 697	11 725
General Means				19 11 416	19 11 442	19 11 429	19 11 647	19 11 636	19 11 642

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 19^m + \frac{1}{2}(11^s\ 429 + 11^s\ 642) = 19^m\ 11^s\ 536,$

$$\rho = \tfrac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \tfrac{1}{2}(11^s\ 642 - 11^s\ 429) = +\ 0^s\ 107$$

The site of the old Longitude Station at Bolarum being, in 1892 no longer available, a new site was chosen 16 feet 4¾ inches more to the west In order therefore to combine this arc with arcs previously measured from Bolarum, a correction of $-\ 0^s\ 011$ must be applied to the above value

Final value of Waltair-Bolarum $= 19^m\ 11^s\ 525$

TABLE VII ABSTRACT OF RESULTS OF ALL OBSERVATIONS

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL

AND THE RETARDATION OF SIGNALS, ρ.

BOLARUM (E) AND BOMBAY (W)

Astronomical Date	Instrumental Position at E	Instrumental Position at W	Apparent Difference of Longitude by Observations with E Clock = ΔL − ρ: By N Stars	E Clock: By S Stars	E Clock: Means	W Clock = ΔL + ρ: By N Stars	W Clock: By S Stars	W Clock: Means
1892			m s	m s	m s	m s	m s	m s
February 9	*I P E*	*I P E*	22 48 686	22 48 641	22 48 621	22 48 788	22 48 778	22 48 757
" "	"	"	48 569	48 586		48 755	48 708	
" 10	*I P W*	"	48 795	48 740	48 733	48 911	48 896	48 869
			48 700	48 698		48 833	48 836	
" 11	"	*I P W*	48 766	48 771	48 727	48 947	48 877	48 896
	"		48 676	48 694		48 912	48 847	
" 12	*I P E*	"	48 708	48 668	48 688	48 902	48 946	48 878
"	"	"				48 856	48 807	
" 13		*I P E*	48 639	48 699	48 639	48 852	48 875	48 834
"		"	48 589	48 627		48 770	48 840	
" 14	*I P W*	"	48 701	48 671	48 683	48 872	48 857	48 867
			48 683	48 676		48 859	48 879	
Means	*I P E*	*I P E*	22 48 621	22 48 638	22 48 630	22 48 791	22 48 800	22 48 796
	I P W	"	48 720	48 696	48 708	48 869	48 867	48 868
		I P W	48 721	48 733	48 727	48 930	48 862	48 896
	I P E		48 708	48 668	48 688	48 879	48 877	48 878
General Means			22 48 693	22 48 684	22 48 688	22 48 867	22 48 852	22 48 860

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 22^m + \frac{1}{2}(48^s\ 688 + 48^s\ 860) = 22^m\ 48^s\ 774,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(48^s\ 860 - 48^s\ 688) = +\ 0^s\ 086$

The site of the old Longitude Station at Bolarum being, in 1892, no longer available, a new site was chosen 16 feet 4⅝ inches more to the west In order therefore to combine this arc with arcs previously measured from Bolarum, a correction of $+\ 0^s\ 011$ must be applied to the above value

Final value of Bolarum–Bombay $= 22^m\ 48^s\ 785$

AND DEDUCTION OF THE APPARENT DIFFERENCE OF LONGITUDE, ΔL AND THE RETARDATION OF SIGNALS, ρ.

FYZABAD (E) AND DEHRA DŪN (W)								
Astronomical Date	Instrumental Position at		Apparent Difference of Longitude by Observations with					
			E Clock = ΔL − ρ			W Clock = ΔL + ρ		
	E	W	By N Stars	By S Stars	Means	By N Stars	By S Stars	Means
1893			m s	m s	m s	m s	m s	m s
March 15	*I P E*	*I P W*	16 20 570	16 20 445	16 20 532	16 20 743	16 20 703	16 20 731
" "	"	"	20 592	20 522		20 761	20 718	
" 16	*I P W*	"	20 595	20 543	20 555	20 859	20 777	20 821
" "	"	"	20 575	20 508		20 866	20 782	
" 17	"	*I P E*	20 810	20 715	20 754	20 846	20 839	20 868
" "	"	"	20 790	20 702		20 914	20 873	
" 18	*I P E*	"	20 640	20 555	20 618	20 735	20 50	20 755
" "	"	"	20 710	20 565		20 727	20 757	
" 19	"	"	20 624	20 544	20 547	20 743	20 723	20 718
" "	"	"	20 546	20 474		20 738	20 667	
" 20	*I P W*	*I P W*	20 706	20 626	20 675	20 756	20 741	20 792
" "	"	"	20 736	20 631		20 843	20 828	
Means	*I P E*	*I P E*	16 20 630	16 20 535	16 20 583	16 20 748	16 20 724	16 20 ,37
	I P W	*I P W*	20 653	20 577	20 615	20 831	20 782	20 807
	"	*I P E*	20 800	20 709	20 754	20 880	20 856	20 868
	I P E	*I P W*	20 581	20 484	20 532	20 752	20 711	20 731
General Means			16 20 666	16 20 576	16 20 621	16 20 803	16 20 768	16 20 786

Whence $\Delta L = \frac{1}{2}\{(\Delta L - \rho) + (\Delta L + \rho)\} = 16^m + \frac{1}{2}(20^s\ 621 + 20^s\ 786) = 16^m\ 20^s\ 704,$

$\rho = \frac{1}{2}\{(\Delta L + \rho) - (\Delta L - \rho)\} = \frac{1}{2}(20^s\ 786 - 20^s\ 621) = +\ 0^s\ 083$

ELECTRO-TELEGRAPHIC LONGITUDES

PART III.

HISTORICAL SKETCH

OF THE

EARLIER MEASUREMENTS OF INDIAN ARCS OF LONGITUDE,

SHOWING REASONS FOR RECOMPUTING

THE SAME, ALSO EXPLANATION

OF THE CAUSES OF

CIRCUIT-ERRORS, AND DESCRIPTION IN DETAIL

OF THE EXPERIMENTS

BY WHICH THEY WERE DISCOVERED,

WITH

REVISED RESULTS OF ARCS IN

VOLUMES IX AND X.

CHAPTER I

ON THE RECOMPUTATION OF THE ARCS CONTAINED IN VOLUMES IX AND X

1.

Introductory

When the operations for determining differences of longitude between certain stations in India by help of the Electric Telegraph were first inaugurated, General J T Walker, R E, who was then Superintendent of the Great Trigonometrical Survey, feeling that some better test of the accuracy of such measurements, than that afforded by the magnitude of their probable errors, was desirable, arranged that the arcs should be so laid out as to form triangular circuits, the closing errors of such circuits would obviously give a most satisfactory check on the accuracy of the results attained It cannot but be regarded as a most fortunate thing, when looked at by the light of subsequent experience, that General Walker's foresight led him to adopt this plan, for by it errors have been brought to notice which would otherwise have escaped detection,—errors serious enough to diminish the value of the work, and yet of such a nature as to be ignored by the ordinary method of computing the probable errors, as they are due to a constant cause, and are not susceptible of elimination by the system of reducing the observations as adopted in the earlier years of these operations

2.

Historical

The longitude equipment, which has been in use at various times since the season 1872-73, when it was first employed by Captain J Herschel and Captain W M Campbell in Southern India, remained essentially the same throughout the nine seasons, the results of which are collected in this volume for final reduction and discussion There have been from time to time minor changes both in the equipment and system of procedure, which it is desirable to glance at in this place, as they bear upon the history of the circuit-errors, and show the reasons why some of the early arcs have been rejected, and the rest re-computed on an improved system. The work of the first season 1872-73 was chiefly tentative, and undertaken especially to enable the observers to become familiar with the instruments, and to decide upon

the best system to be adopted This year's work was definitely rejected, partly for the above reason, but chiefly because of a fault in Telescope No 2, which proved to be so shaky that no confidence could be placed in its performances This fault was remedied by Mr Doderet, Mathematical Instrument Maker to the Madras Government, and a fair start was made in the season 1875-76 During that season and the following ones, moderately good results were obtained, only moderately good because the circuit errors seemed larger than would be expected, considering the minute care taken in the adjustment of the instruments, and in every process connected with the observations Even thus early some anxiety began to be felt as to the cause of these errors, and the bad effect they might eventually produce on the value of the results, as well as a feeling of disappointment that with all the care expended on the work, their source could not be traced out

In the season 1881-82 the circuit-errors increased largely, so much so that it was obvious that unless some remedy were devised it would be almost useless to proceed with the work A further examination of the instruments showed that Mr Doderet's cure had been only temporary, and that the tube of No 2 Telescope had again become loosened to such an extent that the increase of circuit-errors was quite intelligible The telescope was then repaired by Mr Bolton at the Mathematical Instrument Office in Calcutta, and the measurements were proceeded with On resuming work in the seasons 1882 83 and 1883-84 the errors again asserted themselves, though considerably diminished in magnitude, and seemed wrapped in greater mystery than ever

As the large errors in 1881-82 had been clearly traced to unsteadiness of the tube, it was only natural to suppose that the comparatively small errors of the subsequent years might be attributed to an incomplete rectification of this fault, it was therefore determined to return the instruments to the makers, Messrs Cooke and Sons of York, to be thoroughly overhauled, and to have some alterations made in some of their details Suspicion fell upon the Ys of the transit telescopes which were of a peculiar construction They are described at page 3 of Part I of Volume IX of the *Account of the Operations, &c*, and as it was supposed that they *might* be the seat of instability, they were discarded, and new fixed Ys of the old established type supplied in their place

The repaired instruments were examined by Colonel G Strahan, R E, at the Greenwich Observatory before being returned to India, and as the tests applied showed the stability to be satisfactory, operations were renewed in 1885 86 with the expectation of greatly improved results This expectation was however again doomed to disappointment, and although extra precautions and additional changes of pivots, and observers, &c, were introduced, there was no material decrease in the average magnitude of the circuit-errors

3.

Possible Sources of Circuit-Errors

In Sections 3, 4, and 5 of the Appendix to Volume X, will be found a discussion on the so called circuit-errors, in which various surmises are made as to their cause, most of them however being at once dismissed as inadequate to produce the effect

It will be superfluous to enter into a description of all the experiments which have been made to localize the cause of these errors, because many of them have been entirely abortive The observers' attention has been pretty steadily directed to Collimation, Level, and Azimuthal Deviation, as being the most promising quarter in which to experimentalize, and it has now been found that they were justified in this, as the true source of error has been at length localized there, though not exactly in the direction suspected The errors were supposed to be caused by a want of stability in the position of the line of collimation. The process of collimating, *i e*, the determination of the micrometer reading of the telescope

when the sight-line is perpendicular to the axis of the pivots, has always been carried out by Gauss's method, i.e., by two collimators, one placed to the north and one to the south of the transit telescope, and that of levelling by reflection of the wires from mercury placed vertically below the telescope In collimating, the telescope is horizontal, pointed first to the south and then to the north, and in levelling, it is pointed towards the nadir, but in observing clock stars for longitude, the telescope is always pointed within a few degrees of the zenith, and there was no evidence to show whether the sight-line might not shift its position during these various movements To elucidate this point various experiments were made by observing stars alternately direct and by reflection, and by vertical collimators, but the evidence as far as it showed anything, showed that no such instability of the sight line existed

At the commencement of each season, new and elaborate precautions were taken in changing pivots more frequently, in more minute refinements in making the adjustments, and other such matters, in hopes of diminishing these mysterious circuit errors, but all in vain Some of the circuits closed satisfactorily while others showed errors that were much larger than could reasonably be expected or accounted for, thus raising a suspicion that it was more due to a happy chance than to real precision when the errors turned out to be small That a chance elimination of error may really thus occur was pretty clearly shown in the work of 1880 81, in which season the circuit-errors were as small as could reasonably be expected, a result which has been shown by subsequent investigation to be due to mutual cancelment by mere chance It seemed hardly reasonable to hope that after the cause of these mysterious errors had eluded search for so many seasons, it should be eventually completely explained, and that a means of re computation should be discovered, which has almost entirely negatived their effects This is however the case, and the final results in this volume are given to the world in full confidence that their accuracy is probably as high as is possible of attainment with modern instruments

4.

Discovery of the Cause of the Circuit-Errors

The errors have now been traced with considerable certainty to the faulty nature of the collimator object glasses, by which an erroneous determination of the position of the sight-line of the telescope with respect to the axis of the pivots may be, and often has been, made

The way in which the discovery of the source of trouble was led up to, was as follows —It was noticed that on several occasions, notably at Deesa in 1885, that the values of C_0 as obtained in the two pivot positions differed considerably, in fact by a quantity distinctly larger than could be due to faulty observation The discrepancy in the case of Deesa alluded to was no less than nine divisions of the micrometer, a quantity that exceeds many times any possible error of intersection by even an unskilled observer This alteration of nine divisions took place persistently every time the telescope was reversed, (within an amount at least that was well within the limits of observation) throughout the whole six nights of the measurement of the arc Deesa–Mooltan No explanation of this anomaly could be discovered, and no special notice was taken of it at the time But when the computation of this and the adjacent arcs was completed on the system at first adopted, it became evident that there was something very wrong about it, for all the circuits in which it entered showed abnormally large circuit-errors, and this fact led Capt Burrard, who was employed on the work that season (though not at Deesa), to connect the faultiness of the arc with the variation of C_0, and thus to obtain a clue to the solution of the difficulty It seemed extremely improbable that a real change of the position of the sight-line should occur in merely reversing pivots when carefully executed without jar, and next to impossible that this change should almost exactly repeat itself at each subsequent reversal, for it must be remembered that no new strains are set up in the tube or any part of the apparatus by mere reversal, exactly the same part of the pivots being in contact with the Ys in both positions, and no change being made in the

distribution of weights The change of C_0 could only therefore be accounted for by an error in some of the quantities used in its determination. At page 22 of Part I of this volume, the method employed in determining the value of C_0 by means of two collimators, one placed to the north and the other to the south of the transit telescope, is described in detail

The formulæ used are as follows —

$$C_0 = \tfrac{1}{2}\{D + E - k(A - B)\} \text{ for } IPE$$

and

$$C_0 = \tfrac{1}{2}\{D + E + k(A - B)\} \text{ for } IPW$$

where k is a factor employed in reducing the divisions of the micrometer of the south collimator to those of the transit telescope, D is the reading of the transit telescope micrometer when the cross of the North collimator is intersected, E the same for the South collimator, A is the reading of the South collimator micrometer when intersecting the cross of the North collimator, and B is the reading of the South collimator when its moveable wire intersects the cross in its own diaphragm

Apart from the consideration that it is desirable as a general rule to vary as much as possible the circumstances under which a set of observations is taken, the chief reason for changing pivots is, that errors arising from the sight line of the telescope not being perpendicular to the axis of the pivots, or in other words, from faulty collimation, are completely cancelled by taking the mean of the observations in the two pivot positions But this cancelment does not hold if the position of the sight-line with regard to the axis is unstable, and shifts its position during reversal, and it seems to have been somewhat hastily concluded, from the variation in the value of C_0, that such a shift really occurred, hence the idea arose that observations in either pivot position should be made complete in themselves by the application of C_0 as determined by observations in that particular position, without reference to its value after reversal, thereby abandoning almost entirely the principle of cancelment of error by reversal Reverting to the formula

$$C_0 = \tfrac{1}{2}\{D + E \mp k\overline{A - B}\}$$

it seems unlikely that any of the quantities contained therein, with the exception of A, can be affected by the imperfection of the collimator object glasses In determining D and E (the readings of the N and S collimator crosses respectively in the transit telescope) the object glass of the transit telescope being much larger than those of the collimators the whole surface of the latter is invariably brought into use, and moreover B being the reading of the collimator micrometer when its moveable wire is brought into coincidence with its own fixed cross, it is in no way affected by imperfections of the object-glass A *is* however very materially affected, and experiments, which will be subsequently described, show that the reading of A varies considerably according to the particular parts of the object glass brought into play Now this, when reduced to its ultimate consequences, means simply that the angle formed by the sight lines of the two collimators is not correctly determined, or it may express the state of things better to say that owing to faulty object glasses the collimators have no definite sight-lines, their position depending on the part of the object glass in use, and that therefore the angle between them is indeterminate, as this angle enters with opposite signs in C_E and C_W (which symbols will be henceforward used to distinguish C_0 as found by observations *I P E* and *I P W* respectively) it follows that $C_E - C_W$ is equal to twice the value of the error, or uncertainty of this angle, measured in divisions of the transit telescope micrometer

It was not until the arc Deesa-Mooltan was measured that any case had occurred in which the difference between C_E and C_W was sufficiently marked or persistent, to attract attention Now however that the discovery has been once made that this difference exists, and is an uncancelled source of error in an arc, it is not difficult to trace its existence in previous work the greater the difference between C_E and C_W in any arc, the greater will be the correction caused by the re-computation on the principle

of a mean C_0 In some cases in which the difference is small, the correction almost vanishes; this probably arises from the collimators being by chance so placed as to bring nearly the whole of their object-glasses into play, as will be further explained in the next chapter

5.

Effect of Erroneous Measurement of the Angle $(A - B)$

The effect of an error in the measurement of the angle $(A - B)$ may be easily traced out as follows —Take the case of any particular star whose declination is δ

Let t_e, t_w be the observed times of transit *I P E* and *I P W* corrected for all sources of error except collimation

D_E and D_w be the readings of the transit telescope micrometer when the cross of the North collimator is intersected *I P E* and *I P W* respectively

E_E and E_w the same for the South collimator

m the value in seconds of time of one division of the micrometer of the transit telescope

T_1 the true time of transit

θ, or $k\ \overline{A - B}$ the true angle between the sight lines of the two collimators, measured in divisions of the transit telescope micrometer

C_s the reading to which the micrometer is set during the transit observations

Then for *I P E*

$$T_1 = t_e + m\,(C_0 - C_s) \sec\delta = t_e + m\left\{\frac{D_E + E_E}{2} - \frac{\theta}{2} - C_s\right\}\sec\delta,$$

and for *I P W*

$$T_1 = t_w + m\,(C_s - C_0) \sec\delta = t_w + m\left\{-\frac{D_w + E_w}{2} - \frac{\theta}{2} + C_s\right\}\sec\delta$$

Now if instead of C_0, C_E and C_w are used to represent the values obtained for C_0 in the two pivot positions, by means of θ' an erroneous value of θ, and T_E and T_w represent the corrected times of transit, then

$$T_E = t_e + m\,(C_E - C_s) \sec\delta = t_e + m\left\{\frac{D_E + E_E}{2} - \frac{\theta'}{2} - C_s\right\}\sec\delta,$$

and

$$T_w = t_w + m\,(C_s - C_w) \sec\delta = t_w + m\left\{-\frac{D_w + E_w}{2} - \frac{\theta'}{2} + C_s\right\}\sec\delta$$

These being compared with T_1 give

$$T_E - T_1 = m\frac{\theta - \theta'}{2}\sec\delta,$$

and

$$T_w - T_1 = m\frac{\theta - \theta'}{2}\sec\delta,$$

i e each value of the arc is burdened with an error of the same magnitude and sign, and therefore that their mean is burdened with the same error

A mean C_0 dispenses entirely with the use of the faulty angle θ', so long as the collimators are not disturbed, for

$$C_0 = \tfrac{1}{2}(C_E + C_W) = \tfrac{1}{2}\left\{\frac{D_E + E_E}{2} - \frac{\theta'}{2}\right\} + \tfrac{1}{2}\left\{\frac{D_W + E_W}{2} + \frac{\theta'}{2}\right\}$$

$$= \tfrac{1}{4}\{D_E + D_W + E_E + E_W\}$$

6.

Summary of Reasons for adopting a Mean C_0

To justify then the adoption of the computation with the mean C_0, we have the following facts — (1) In examining the circuits formed by the arcs when computed by the old method, large circuit errors often appear where the differences between C_E and C_W are large, (2) Errors in the measurement of the angle between the sight lines of the two collimators are competent to, and actually do, produce the differences between C_E and C_W; (3) Experiments, to be described in the next chapter, show that there are defects in the object glasses of the collimators, and possibly also in those of the transit telescopes, which make the measurement of this angle doubtful, (4) The extreme improbability of any such periodic movement in the position of the sight line as would on reversal cause the observed differences between C_E and C_W, (5) The desirability of carrying out in its integrity the principle of cancelment of collimation error by reversal; and (6) The fact that with one or two very trifling exceptions the circuit errors are notably diminished throughout the whole network, and brought down to a satisfactorily low average This last consideration, if standing alone, would carry little weight, but taken in connection with the others is significant

7.

Rejection of certain Arcs

For the reasons given above a re computation of all the arcs (with the exception of those of 1881 82) has been carried out on the principle of a mean C_0, before they have been taken in hand for the simultaneous reduction It is important to note that so long as the *same* value of C_0 is used in both positions, its *actual* magnitude is of little consequence, as not affecting the principle of cancelment

The reason why the arcs of 1881-82 have been exempted from re-computation is that as the tube of No 2 telescope was obviously shaky during that season, no system of calculation could render its performances trustworthy, and the entire work of that season has been rejected This is of little consequence as Hazaribagh—the station to which most of the arcs measured that season were joined—is of little importance in the general network, and may be omitted without detriment, of the remaining arcs of that season, two, *viz*, Fyzabad–Agra and Jalpaiguri–Calcutta, were subsequently re-measured, after the tube had been repaired, with results so different that the old values have been entirely rejected

The effect of shakiness of the telescope tube is easily traced by an examination of the observations for determining C_0 When the tube is steady, there is very little fluctuation in the values of D and E so long as the pivots are not reversed, although C_0 may vary considerably when there is any shake or looseness, it becomes at once apparent even without pivot reversal, by the great differences in the readings of D and E, according to the direction in which the telescope is rotated, whether from the nadir upwards, or from the zenith downwards It is on account of such differences as these that the arcs of 1881 82 have been rejected, and by no means because the circuit-errors are abnormally large

CHAPTER II

ON SOME EXPERIMENTS FOR TESTING THE OBJECT GLASSES OF THE TRANSIT TELESCOPES AND OF THE COLLIMATORS

1.

Introductory Remarks

It has been shown in the preceding chapter that any error in measuring the angle (A — B), at which the sight lines of the two collimators are inclined to each other, vitiates the determination of C_0 in such a way that observations in both pivot positions are affected with an error in the same direction, if the sight line of the transit telescope remains immoveable with regard to the axis of the pivots during reversal It was also shown that, on this hypothesis of perfect stability, $C_0 = \frac{1}{2}\{C_E + C_W\}$ If an accurate value of C_0 be required from observations in one pivot position, it is imperative that the angle between the sight lines of the collimators should be determined with great precision, as its value enters directly into the computation of C_0, but if observations in the other pivot position be added, without any disturbance of the collimators, and a mean taken between the two, this angle is eliminated from the result The experiments now to be described show that, except under special conditions which are somewhat troublesome to secure in actual practice, and which as a matter of fact have not obtained hitherto, there are defects in the object-glasses of the collimators which render the measurement of this angle uncertain, and that on this account neither C_E nor C_W *alone* are to be trusted in reducing transit observations

2.

Classification of Experiments

For the examination of the object glasses of the collimators and the transit telescopes the following five classes of experiments were devised —

(1) Experiments on the effects produced in the value of C_0 by small vertical, and lateral displacements of the collimators with regard to the sight-line of the transit telescope, without reversal of pivots

(2) Experiments on the value of C_0 as obtained from collimators in horizontal and vertical positions, as well as at intermediate altitudes.

(3) Experiments to ascertain whether any difference in the value of C_0 was noticeable when the transit telescope was removed, so that vision was no longer effected through the aperture in the cube

(4) Experiments on the object-glasses of the collimators with full and reduced apertures

(5) Experiments on distant meridian marks, and on images of the wires reflected from mercury, with full and reduced apertures, to test the object-glasses of the transit telescopes

The details of these five classes of experiments, so far as they are necessary to justify the conclusions arrived at, will now be given

3.

First Class of Experiments

The two collimators being placed on their respective piers in the position usually adopted in actual work, were very carefully aligned, so that their sight-lines were not only *parallel*, but as nearly *coincident* as could be effected, and centrally placed with regard to the aperture in the cube of the transit telescope This was accomplished by the following contrivance A lamp placed at the eye end of one collimator projected from the object end a cylindrical beam of light of the same diameter as the object-glass, and this being received on a white disk of cardboard placed over the object glass of the other collimator enabled the observers to obtain the required coincidence without much trouble, the exactness of parallelism being subsequently gained by a cautious lateral shifting of the eye end of one of the collimators, till the two crosses were noted as superimposed, or very nearly so, the final adjustment was effected with the micrometer The value of C_0 was then determined by the usual process as described at page 22 of Part I of this volume

The collimators were then moved half an inch to the right, to the left, upwards, and downwards successively, still retaining exact parallelism and coincidence of sight lines, as well as uninterrupted vision through the cube Under none of these changes was any material change noted in the value of C_0, nor any difference between C_E and C_W The effect of lateral displacement is obviously to bring into use different parts of the object-glass of the transit telescope This is not however a consequence of vertical displacement, as might at first sight be supposed, because in this case the part of the object glass used in viewing the north collimator when the collimators are depressed half an inch, is the same as that which comes into play in viewing the south collimator when the collimators are raised half an inch, and *vice versâ*

The amount of lateral and vertical displacement available is very limited, for the collimator object-glasses being 2½ inches in diameter, and the aperture in the cube only 3¼ inches, any displacement, more than that mentioned above, gives rise to partially obstructed vision through the cube, thus introducing new conditions which are dealt with under the fourth class The object-glasses of the transit telescopes being five inches in diameter, it follows that only a small portion towards the centre can thus be dealt with

4.

Second Class of Experiments

In these, an endeavour was made to ascertain if C_0 showed any variation corresponding to different altitudes at which the collimators were placed, for it seemed by no means unlikely that in raising

the telescope from a horizontal position towards the zenith, varying strains might be set up, which would conceivably alter the value of C_0 These experiments were inconclusive, and showed no variations in C_0 traceable to such a cause In carrying them out a peculiar form of vertical collimator was used for zenith observations, which proved to be so handy and accurate, that it may be worth while to describe it in this place The instrument is shown in Plate IV It is a modified form of that known as Captain Kater's vertical floating collimator, a contrivance which has rather fallen into disuse in the present day. It consists essentially of an annular wooden trough, supported on two T-iron bars spanning the observatory in an east and west direction, this trough is turned out of a solid block, in which a substantial wooden ring, nearly square in section, floats on mercury Attached to this ring by two stout brass arms is a collimating telescope fitted with a micrometer, so as to hang vertically when the ring is floating in the trough so far the principle is exactly that of Captain Kater's collimator* He seems to have concluded that the telescope thus hanging freely, and floating on mercury would always recover the same inclination to the horizontal plane, after being rotated through an angle of 180°, or being disturbed in any way In these experiments this was not found to be strictly the case, and as extreme refinement was aimed at, it was thought better to attach two very sensitive and well tested levels to the floating ring, as shown in the Plate By reading these, the necessity for assuming the unchanged inclination of the telescope to the horizontal plane was obviated The rough adjustment to verticality of the sight line was made in the first instant by placing shot in holes formed for this purpose in the upper surface of the ring, the final adjustment being secured by the micrometer screw The levels were then so adjusted that the bubbles played near the centres of their runs, and then the instrument was ready for use in the determination of the true zenith point by rotation through 180° The ready reversal by merely giving a slight twist to the ring rendered this a most handy means of employing a fixed zenith point, which for convenience, ready application, and precision, left nothing to be desired The ring when rotated was stopped, when it came to the proper position, by a projecting pin as shown in the Plate

5.

Third Class of Experiments

These experiments showed conclusively that no change could be detected in C_0, whether the vision was through the aperture of the cube, or the telescope was entirely removed, so long as the alignment was sufficiently perfect to ensure uninterrupted vision If the alignment was not good, differences in C_0 owing to partial obstruction of the field of view of the collimators appeared, but these will be dealt with under the fourth class As no special care has been taken in the longitude operations that the view through the cube should be entirely unobstructed, it seems quite likely that some of the anomalies in C_0 may be traceable to this source

6.

Fourth Class of Experiments

These are the most important of all, and are in themselves quite sufficient to afford reasons for the differences between C_E and C_W They deal with the quantity A in the formula $C_0 = \frac{1}{2}\{D + E - k\,\overline{A - B}\}$, this being the reading of the South collimator micrometer, when its moveable wire intersects the North collimator cross The reading was taken under various conditions of full and of reduced apertures, and shows discrepancies under these circumstances sufficient to account for the mysterious variations of C_0 The two collimators being adjusted carefully, as described under the first class of these experiments, a

* In the Plate the ring, with the telescope and levels attached, is represented as raised above the annular trough for the sake of greater clearness.

semicircular disk of cardboard of the same diameter as the object-glasses of the collimators was prepared, and so adjusted as to shut off consecutively the east, west, upper, and lower halves of the effective aperture The reading of A was taken under each of these conditions with the results given in the following table —

Table I—VALUES OF A —(Collimators appertaining to Telescope No 1)

	Full aperture of both Collimators	Eastern half of object glass in use — Disk inserted in North collimator	Eastern half — South collimator	Western half of object glass in use — Disk inserted in North collimator	Western half — South collimator	Upper half of object glass in use — Disk inserted in North collimator	Upper half — South collimator	Lower half of object glass in use — Disk inserted in North collimator	Lower half — South collimator	REMARKS
Each of the readings in these columns is the mean of two, one taken by Captain Burrard, and one by Lieut Lenox Conyngham	58 2 56 8 57 0 58 2	58 7 58 7 59 0 60 2	59 2 60 2 57 7 59 3	53 9 54 2 54 2 55 3	53 6 54 0 56 0 53 0 54 3	57 5 57 5 59 1 58 5	58 0 57 2 57 3 57 3	58 5 59 0 59 8 61 0	59 2 57 0 56 6 57 5	At the end of the experiments the disk was removed, and the reading of A again taken, to see if any movement had taken place
Means	57 6	59 2	59 1	54 4	54 2	58 2	57 5	59 6	57 6	
Final Means	$A_0 = 57\ 6$	$A_E = 59\ 2$		$A_W = 54\ 3$		$A_U = 57\ 9$		$A_L = 58\ 6$		

In this table A is expressed in divisions of the South collimator micrometer To convert A (or differences between two values of A) into divisions of the transit telescope micrometer, in which unit D, E and C_0 are always expressed, it must be multiplied by 1 666 The subscripts O, E, W, U and L in this, and succeeding tables, signify that the whole aperture, the eastern, western, upper, and lower halves respectively of the object glasses were in use

It would have been better in some respects if a diaphragm obscuring three quarters, instead of one half, of the apertures had been employed, leaving one quarter open in the shape of a sector, but it was found that the great diminution of light thereby caused rendered the intersections uncertain and difficult

As parallel rays are being dealt with it is immaterial in theory in which of the two collimators the disk is inserted, but as the alignment with every precaution might not be quite perfect, the disk was inserted in each successively The table shows that the precaution is almost unnecessary, the differences being generally so small as not to exceed the uncertainties of observation

The greatest discrepancy occurs between the eastern and western halves, amounting to 4 9 divisions of the collimator microscope, or 8 1 divisions of that of the transit telescope Now assuming as an extreme case that the western half gives the true result, then if in practice, through bad alignment, the eastern half only is in use—and against such an event there is no *à priori* probability—the angle (A—B) between the sight lines of the collimators would be in error by that amount, and this error (as has been shown above) enters directly into the determination of C_0 with the same sign both *IPE* and *IPW*, the effect being that transits of stars in *both* positions occur either too early or too late by $m \sec \delta \times 8\ 1$, where $m = 0^s\ 0225$, the value in seconds of time of one division of the micrometer, and δ is the star's declination In the case of an equatorial star this amounts to $0^s\ 18$ Stars used for longitude work are generally selected within a few degrees of the zenith, and for such, the error in the time of transit arising from this source would be, in latitude λ, $0^s\ 18 \times \sec \lambda$, a quantity which would vary from $0^s\cdot 18$ in South

India to 0' 21 in the Punjab The great distance apart at which the collimators have been placed in practice rendered the coincidence of their sight-lines difficult to secure, and the alignment has hitherto been considered sufficiently good in actual practice if clear vision of both crosses was obtained in the field of the south collimator no attempt has hitherto been made to ascertain what parts of the object-glasses were out of use, either on account of imperfect alignment, or on account of the interference of the cube of the transit telescope, through which by means of a small aperture the collimators view each other

It seems obvious therefore that considerable uncancelled errors may exist in transit observations owing to this peculiarity in the collimators, which produces different values of C_0 according to the part of the lenses brought into use

It is perhaps hardly fair to the maker of these instruments to have allowed them to be used so excentrically that a large portion of their object glasses was obscured, a practice which seems to have arisen originally from the difficulty of adjusting them truly, when at such a considerable distance apart as thirty feet It is a troublesome process to ensure the coincidence of the sight lines under these conditions, especially as the necessity of their passing centrally through the aperture in the cube is equally important, and hence the practice arose of considering the clearness of vision a sufficient test of adjustment It is not known why the original observers selected this distance of thirty feet, but it was subsequently diminished with obvious advantage It is fortunate that there has been occasionally a very notable want of adjustment in this respect, otherwise the peculiarity of the object glasses might never have been suspected or proved, for if the want of truth in the alignment of the collimators had been trifling, small errors in the work would have remained, small enough to have escaped the close search to which they have now been subjected, and yet large enough to diminish the precision of the results Under existing conditions although good alignment is very desirable, still it would never do away entirely with the necessity for using a mean C_0, for so long as any regularly recurring difference exists between C_E and C_W, so long will suspicion fall rather on the angle $(A - B)$ than upon any instability of the sight line

7.

Fifth Class of Experiments

In commencing the testing of the object-glass of the transit telescope the collimators were used, and the experiment was conducted as follows —The three telescopes were carefully aligned, and a lamp being placed behind the eye pieces of the collimators as in the fourth class, a bright circle of light was cast on a cardboard disk inserted over the object-glass of the transit telescope The collimators were moved until this circle of light in both positions was at the centre of the disk, the telescope being horizontal

An aperture was then cut from the centre of the disk of the same size as this circle of light Theoretically the insertion of this annular disk would have no effect on the readings of D and E because that part of the object glass concealed by it could in no case come into play, until the alignment was disturbed A semicircular disk was then prepared which could be inserted in the object glass of either collimator, or in the annular disk of the transit telescope by means of this contrivance the apertures of any one of the three telescopes could be diminished at will, and in any desired position The test consisted in taking micrometer readings of the transit telescope when intersecting, firstly, the cross of the north collimator, and secondly, that of the south collimator, with various apertures, the results being given in the two following tables D is the reading for the intersection of the north collimator and E for that of the south, the subscripts having the same meaning as in the table in section 6 of this chapter

Table II—VALUES OF D—(Telescope No 1)

	Object glasses of Telescope and Collimators open	Eastern half of object glasses in use		Western half of object glasses in use		Upper half of object glasses in use		Lower half of object glasses in use		REMARKS
		Semi circular disk inserted in collimator	Aperture in disk of Telescope half covered	Semi circular disk inserted in collimator	Aperture in disk of Telescope half covered	Semi circular disk inserted in collimator	Aperture in disk of Telescope half covered	Semi circular disk inserted in collimator	Aperture in disk of Telescope half covered	
Means of two readings one by Capt Burrard, and one by Lieut Lenox Conyngham	1767 4	1769 3	1768 5	1764 2	1766 2	1764 9	1765 0	1771 5	1770 0	At the end the disks were removed, and the reading of D again taken, to see if any movement had taken place in either Collimator or Telescope during the experiments
	67 7	69 7	69 7	63 6	65 5	65 7	64 1	69 3	70 8	
	67 2	68 0	69 0	63 2	64 7	66 0	66 1	69 0	70 7	
	67 4	68 2	69 1	62 9	65 4	66 0	65 0	69 0	70 4	
Means	1767 4	1768 8	1769 1	1763 5	1765 5	1765 7	1765 1	1769 7	1770 3	
Final Means	D_O = 1767·4	D_E = 1769 0		D_W = 1764 5		D_U = 1765 4		D_L = 1770 0		

Table III—VALUES OF E—(Telescope No 1)

	Object glasses of Telescope and Collimators open	Eastern half of object glasses in use		Western half of object glasses in use		Upper half of object glasses in use		Lower half of object glasses in use		REMARKS
		Semi circular disk inserted in collimator	Aperture in disk of Telescope half covered	Semi circular disk inserted in collimator	Aperture in disk of Telescope half covered	Semi circular disk inserted in collimator	Aperture in disk of Telescope half covered	Semi circular disk inserted in collimator	Aperture in disk of Telescope half covered	
Means of two readings, one by Capt Burrard, and one by Lieut Lenox Conyngham	1448 1	1450 6	1450 4	1447 3	1444 9	1450 7	1450 5	1448 0	1449 0	At the end the disks were removed, and the reading of E again taken, to see if any movement had taken place during the experiments
	48 7	50 5	50 0	46 8	45 9	50 7	51 0	45 8	48 2	
	47 5	50 7	49 7	47 3	46 2	50 4	51 8	47 9	49 0	
	48 3	50 3	49 9	48 5	45 8	50 6	51 2	47 4	48 5	
Means	1448 1	1450 5	1450 0	1447 5	1445 7	1450 6	1451 1	1447 3	1448 7	
Final Means	E_O = 1448 1	E_E = 1450 3		E_W = 1446 6		E_U = 1450 9		E_L = 1448 0		

From these tables it will be seen that D_E differs from D_W by 4 5 micrometer divisions and D_L from D_U by a slightly larger amount, the differences in E being somewhat smaller, *viz*, 3 7 and 2 9 respectively

As however the object-glasses of the collimators have been proved to be capable of producing larger differences than these under certain circumstances, when employed by themselves alone, it seems very doubtful if such differences can be fairly imputed to the transit telescope at all.

It had been noticed by Captain Burrard previously, that by tilting the collimators in actual practice, a change in the value of C_0 was caused, and this was supposed to be due to the fact that a different portion of the object-glass of the transit telescope was brought into play This is probably not the cause of the change, for as the telescope is much nearer to each of the collimators than they are to each other, it follows that any alteration in their mutual inclination causes more displacement between their sight lines, than between them and that of the transit telescope If the two collimators were correctly aligned before tilting, then it is certain that they could not be so after tilting, unless one of them was bodily raised or depressed, which was never the case The discrepancies due to incorrect alignment, which are abundantly evident in the fourth class of these experiments, are then produced, and therefore there is no reason for supposing the existence of any imperfection of the object glass of the transit telescope on these grounds

It should be mentioned here that in practice the alignment can never be so faulty, as to cause the obscuration of any part of the object glass of the transit telescope, owing to the necessity of the collimators being mutually visible through the aperture in the cube As the object glasses of the collimators had been proved to be faulty, inasmuch as they gave different images for different parts of the aperture, it seemed to be futile to attempt further to examine the object-glasses of the transit telescopes by their means It fortunately happens that an excellent distant meridian mark exists at Dehra Dun, consisting of a pyramid of masonry eight feet high, and distant about nine miles on a ridge of the sub-Himalayas nearly 5,000 feet above the station, and this was viewed with full and reduced apertures, as in the case of the collimator experiments No resulting differences in the readings of the micrometer when the moveable wire was made to intersect the mark were noticeable, but these results are not considered of much weight, as owing to haze the mark was somewhat unsteady and difficult to intersect

The object glass was subsequently tested again on the same principle, except that instead of a distant mark, the reflexion of the wires themselves from the surface of mercury was used as an object for intersection with varying apertures Again no variations were recognizable, and hence it has been concluded that the object glass is as nearly as possible perfect Now if it really be perfect, the readings D and E will not vary, even if the collimators are not correctly aligned, unless the alignment is so bad that only parts of the collimator object glasses come into use, a state of things which is not possible in practice, for it would prevent mutual visibility of the collimators through the aperture in the cube

It may therefore be concluded that the variations in C_0 are solely due to the uncertainty in the quantity A in the formula $C_0 = \frac{1}{4}\{D + E \mp k \overline{A - B}\}$ or, in other words, are caused by *faulty alignment of the collimators*, so that parts of their object glasses are shut out, either by non coincidence of their sight lines, or by interposition of part of the cube of the transit telescope

This completes the series of experiments with Telescope No 1 and its collimators subsequently a similar series was instituted for the second equipment, with the same results, *i e*, that the value of A depended greatly upon which parts of the collimator object glasses were brought into effective use, but differing only in this respect that the object glass of Telescope No 2 did not come out of the trial as successfully as that of Telescope No 1

Observations with it were taken as before with full and reduced apertures on the distant meridian mark, but for the same reason as in the former case not much reliance was placed on the results The reflexion of the wires from the mercury trough was then used as an image for observation, and it was found that material differences existed in the readings according to the part of the object glass in use

The following table shows the values of M, or the readings of the micrometer when the direct and reflected images of the wire coincided, from which it is evident that a serious discrepancy exists between the eastern and western halves of the object-glass of Telescope No 2 —

Table IV—VALUES OF M —(Telescope No 2)

Whole object glass in use	North half in use	South half in use	West half in use	East half in use
1518 3	1517 9	1519 1	1519 0	1515 4
18 5	17 3	17 3	19 5	16 6
17 0	17 2	18 0	19 5	15 2
17 [illegible]	18 0	19 0	19 8	14 1
18 4				
1517 9	1517 6	1518 4	1519 5	1515 3
1518 1	1519 0	1519 0	1521 2	1516 5
17 8	19 0	18 5	20 4	16 4
18 8	19 0	18 1	19 0	15 9
18 9	19 0	18 9	20 0	16 5
1518 4	1519 0	1518 6	1520 2	1516 3
M_0 1518 2	M_N 1518 3	M_S 1518 5	M_W 1519 9	M_E 1515 8

It is satisfactory to find that when the collimators were so arranged as to show varying differences between C_E and C_w, that C_0 the mean of the two remained nearly constant Thus at Kurrachee in 1890 four values of C_E and C_w were taken as follows, the collimators being moved after each pair —

C_E	C_w	Mean = C_0
1720 6	1724 3	1722 5
22 5	24 0	23 3
25 8	22 1	23 9
26 0	20 1	23 1

The same process repeated at Waltair in 1891, when the collimators were wholly removed after each night's work, and set up again the next day, gave results as follows —

C_E	C_w	Mean = C_0
1484 4	1473 6	1479 0
82 2	76 9	79 6
81 3	77 8	79 6
84 8	73 2	79 0
78 0	82 3	80 2

and lastly in Dehra Dun in 1892 the following values were obtained —

C_E	C_W	Mean = C_0
1512 1	1520 1	1516 1
15 1	16 7	15 9
15 5	15 7	15 6
16 1	14 8	15 5

8.

Conclusions

To sum up, the following conclusions may be legitimately drawn from these experiments —(1) That the instability of the sight-line of the transit telescopes is apparent only, not real, (2) That the collimators of both equipments are faulty, inasmuch as their object glasses give different images according to the part of them that comes into play, (3) That the object glass of Telescope No 1 is very nearly perfect, (4) That the object-glass of Telescope No 2 is decidedly of inferior form, (5) That *very careful* alignment will nearly prevent these imperfections from having an injurious effect on the final results, (6) That the use of a mean C_0 does so almost completely, and (7) That a very careful alignment in future combined with the adoption of a mean C_0 will give results, from which errors due to these faults may be considered as practically entirely eliminated

Explanation of Revised Abstract of Determinations of Collimation and Level Correction Constants

This Abstract differs from those of the same kind in previous volumes only in the columns headed c_1, c and b

In order to obtain the revised figures in these columns the mean of the values of C_0 in position *I P E*, and in position *I P W* are entered separately in the column of remarks

The mean of these two quantities is taken as the final value of C_0 to be used for *every day* of observation on that particular arc regardless of pivot position

c_1 is the collimation correction constant It is equal to $C_0 - C_s$ for *I P E*, and $C_s - C_0$ for *I P W*

c is obtained from c_1 by subtracting the diurnal aberration

b is the level correction constant It is equal to $C_0 - M$ for *I P E*, and $M - C_0$ for *I P W*

Astronl Date	Station	Instrumental Position	Collimation C_0	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks
1876			d	d	d	d	d	d				d	d	d	d	d	d	
Jan 28	BELLARY (Telescope No 1)	*IPE*	55 3	55 0	+2 2	+1 3	*54 4 53 5	+3 2	Mean C_0 *IPE* = 56 1 d *IPW* = 58 3 General Mean = 57 2	BOMBAY (Telescope No 2)	*IPE*	96 4	95 0	+0 3	−0 6	96 0	−0 7	Mean C_0 *IPE* = 96 0 d *IPW* = 94 6 General Mean = 95 3
" 29		*IPW*	58 1	55 0	−2 2	−3 1	56 1 55 5	−1 4			*IPW*	94 5	95 0	−0 3	−1 2	98 7	+3 4	
" 30		"	59 3	55 0	−2 2	−3 1	56 4 56 9	−0 5				94 1	95 0	−0 3	−1 2	94 3	−1 0	
Feb 8		*IPE*	56 0	55 0	+2 2	+1 3	51 1	+6 1			*IPE*	93 3	95 0	+0 3	−0 6	96 8	−1 5	
" 9		"	57 1	55 0	+2 2	+1 3	55 2 55 3	+1 9			"	96 3	95 0	+0 3	−0 6	97 2	−1 9	
" 10		*IPW*	57 5	55 0	−2 2	−3 1	58 8	+1 6			*IPW*	95 2	95 0	−0 3	−1 2	97 4	+2 1	
Feb 19	BOLARUM (Telescope No 2)	*IPW*	100 2	95 0	−4 7	−5 6	95 0 94 9	−4 7	Mean C_0 *IPE* = 98 7 d *IPW* = 100 7 General Mean = 99 7	BELLARY (Telescope No 1)	*IPW*	58 9	60 0	+3 0	+2 1	58 4 58 7	+1 6	Mean C_0 *IPE* = 54 7 d *IPW* = 59 2 General Mean = 5[illegible] 0
" 20		"	100 7	95 0	−4 7	−5 6	93 4	−6 3				58 1	60 0	+3 0	+2 1	58 8	+1 8	
" 21		"	101 1	95 0	−4 7	−5 6	99 5 99 0	−0 4				60 6	60 0	+3 0	+2 1	61 2	+4 2	
" 22		*IPE*	98 6	95 0	+4 7	+3 8	102 4	−2 [illegible]			*IPE*	54 5	55 0	+2 0	+1 1	60 7	−3 7	
" 23		"	98 1	95 0	+4 7	+3 8	100 9	−1 2				55 3	55 0	+2 0	+1 1	52 1	+4 9	
" 24			99 4	95 0	+4 7	+3 8	101 2	−1 5				54 4	55 0	+2 0	+1 1	51 1	+5 9	
Mar 3	MADRAS (Telescope No 1)	*IPE*	48 1	50 0	−1 7	−2 6	53 1	−4 8	Mean C_0 *IPE* = 48 2 d *IPW* = 48 3 General Mean = 48 3	BOLARUM (Telescope No 2)	*IIE*	100 5	100 0	−0 7	−1 6	96 [illegible]	+2 [illegible]	Mean C_0 *IIE* = 100 5 d *IPW* = 98 1 General Mean = 99 3
5			4[illegible] 6	50 0	−1 7	−2 6	49 4	−1 1				100 2	100 0	−0 [illegible]	−1 [illegible]	100 3	−1 0	
6			46 9	50 0	−1 7	−2 6	49 4	−1 1				100 8	100 0	−0 [illegible]	−1 6	100 2	−0 9	
" 7		*IPW*	48 1	50 0	+1 7	+0 8	50 3	+2 0			*IIW*	[illegible] 9	100 0	+0 [illegible]	−0 2	97 5	−1 8	
" 8		"	48 5	50 0	+1 7	+0 8	48 8	+0 5				9[illegible] 2	100 0	+0 7	−0 2	97 5 96 1	−2 5	
" 12			48 3	50 0	+1 7	+0 8	47 5	−0 8				99 1	100 0	+0 7	−0 2	97 4	−1 9	
Mar 22	MADRAS (Telescope No 1)	*IPW*	48 6	50 0	+0 8	−0 1	47 1	−2 1	Mean C_0 *IPE* = 49 8 d *IPW* = 48 5 General Mean = 49 2	BELLARY (Telescope No 2)	*IPE*	71 2	75 0	−4 4	−5 3	79 5 [illegible]6 8	−7 6	Mean C_0 *IPE* = 71 1 d *IPW* = 70 1 General Mean = 70 6
" 24		"	48 2	50 0	+0 8	−0 1	48 7	−0 5			"	71 4	75 0	−4 4	−5 3	69 6 68 0	+1 8	
" 26		"	48 6	50 0	+0 8	−0 1	48 9	−0 3			*IPW*	70 4	75 0	+4 4	+3 5	75 4 76 2	+5 2	
" 29		*IPE*	47 0	50 0	−0 8	−1 7	47 6	+1 6				69 6	75 0	+4 4	+3 5	[illegible]2 7	+2 1	
" 30		"	46 6	50 0	−0 8	−1 7	47 1	+2 1			"	70 4	75 0	+4 4	+3 5	66 6 6[illegible] 4	−3 6	
31			51 7	50 0	−0 8	−1 7	48 2	+1 0			"	70 1	75 0	+4 4	+3 5	65 7 66 9	−4 3	
Apr 1		"	52 6	50 0	−0 8	−1 7	48 6	+0 6			*IPE*	[illegible]1 0	75 0	−4 4	−5 3	63 7	+6 9	
" 2		"	51 1	50 0	−0 8	−1 7	47 9	+1 3			"	[illegible]0 9	75 0	−4 4	−5 3	63 4 63 3	+7 2	

Astronl Date	Station	Instrumental Position	Collimation				Level		Remarks	Station	Instrumental Position	Collimation				Level		Remarks
			C_0	C	c_1	c	M	b				C_0	C_s	e_1	c	M	b	
			d	d	d	d	d	d				d	d	d	d	d	d	
1876 Apr 11	BANGALORE (Telescope No. 1)	I.P E	48.0	50.0	−0.6	−1.5	48.0	+1.4	Mean C_0 d I P E = 48.8 I P W = 49.9 General Mean = 49.4	BELLARY (Telescope No 2)	I P E	73.0	70.0	+0.6	−0.3	73.0	−2.4	Mean C_0 d I.P E = 72.5 I P W = 68.6 General Mean = 70.6
" 12		,	48.5	50.0	−0.6	−1.5	47.9	+1.5			"	72.6	70.0	+0.6	−0.3	72.9 72.8	−2.3	
" 13		"	49.9	50.0	−0.6	−1.5	47.7	+1.7			"	71.9	70.0	+0.6	−0.3	73.2 72.9	−2.5	
, 14		I P W	49.9	50.0	+0.6	−0.3	51.6	+3.2			I P W	67.9	70.0	−0.6	−1.5	62.4	−8.2	
" 17		,	49.8	50.0	+0.6	−0.3	49.1	−0.3			"	69.1	70.0	−0.6	−1.5	67.9 67.3	−3.0	
" 18		"	50.0	50.0	+0.6	−0.3	49.3	−0.1			,	68.8	70.0	−0.6	−1.5	69.5 68.1	−1.8	
1877 Jan 18	VIZAGAPATAM (Telescope No. 1)	I P E	77.2						Mean C_0 d I P E = 76.5 I P W = 75.5 General Mean = 76.0	MADRAS (Telescope No 2)								Mean C_0 d I P E = 81.7 I P W = 82.5 General Mean = 82.1
" 19		,	78.5								I P E	84.2						
" 20		"	76.1								,	83.3						
" 21			76.8															
" 22			75.0	80.0	−4.0	−4.9	81.3	−5.3			,	79.2	85.0	−2.9	−3.8	84.8	−2.7	
" 23		,	76.1	80.0	−4.0	−4.9	81.8	−5.8			"	80.8	85.0	−2.9	−3.8	84.7	−2.6	
, 24		,	76.9	80.0	−4.0	−4.9	74.2	+1.8			"	82.1	85.0	−2.9	−3.8	84.6	−2.5	
" 25		,	77.5	80.0	−4.0	−4.9	75.7	+0.3			"	81.9	85.0	−2.9	−3.8	85.7	−3.6	
" 26		,	74.5	80.0	−4.0	−4.9	74.7	+1.3			,	80.2	85.0	−2.9	−3.8	84.9	−2.8	
" 27		I P W	74.8	80.0	+4.0	+3.1	76.6	+0.6			I P W	83.6	85.0	+2.9	+2.0	86.6	+4.5	
" 29		,	75.6	80.0	+4.0	+3.1	75.9	−0.1			"	82.1	85.0	+2.9	+2.0	87.1	+5.0	
, 31		"	76.2	80.0	+4.0	+3.1	76.4	+0.4			"	82.4	85.0	+2.9	+2.0	87.6	+5.5	
Feb 1		,	75.5	80.0	+4.0	+3.1	77.3	+1.3			"	81.8	85.0	+2.9	+2.0	88.6	+6.5	
Feb 8	VIZAGAPATAM (Telescope No 1)	I P W	75.6	80.0					Mean C_0 d I P E = 78.4 I P W = 76.8 General Mean = 77.6	BELLARY (Telescope No 2)	I P E	74.7	75.0					Mean C_0 d I P E = 74.4 I P W = 75.8 General Mean = 75.1
, 9		"	75.9	80.0							"	72.6	75.0					
, 14		"	76.9	80.0														
" 17		,	76.6	80.0	+2.4	+1.5	79.1	+1.5			I P W	75.3	75.0	−0.1	−1.0	72.6	−2.5	
19		I P E	6.7	80.0							I P E	74.8	75.0					
, 21		"	76.8	80.0	−2.4	−3.3	74.5	+3.1			,	75.8	75.0	+0.1	−0.8	75.7	−0.6	
" 22		,	77.9	80.0	−2.4	−3.3	74.2	+3.4			"	74.1	75.0	+0.1	−0.8	76.9	−1.8	
, 23		I P W	78.4	80.0	+2.4	+1.5	82.2	+4.6			I P W	75.7	75.0	−0.1	−1.0	75.6	+0.5	
, 24		,	77.3	80.0	+2.4	+1.5	81.7	+4.1			"	76.4	75.0	−0.1	−1.0	73.9	−1.2	
, 25		I P E	82.3	80.0	−2.4	−3.3	75.7	+1.9			I P E	74.0	75.0	+0.1	−0.8	81.5	−6.4	
Mar 22	MANGALORE (Telescope No 1)	I P E	70.4	70.0	+3.9	+3.0	75.9	−2.0	Mean C_0 d I P E = 69.9 I P W = 77.9 General Mean = 73.9	BOMBAY (Telescope No 2)	I P E	68.2	70.0	−1.0	−1.9	70.4	−1.4	Mean C_0 d I P E = 68.0 I.P W = 70.0 General Mean = 69.0
, 24		"	70.0	70.0	+3.9	+3.0	71.2	+2.7			"	68.8	70.0	−1.0	−1.9	71.6	−2.6	
, 25		,	69.4	70.0	+3.9	+3.0	71.0	+2.9			,	67.1	70.0	−1.0	−1.9	72.1	−3.1	
, 26		I P W	77.9	70.0	−3.9	−4.8	73.0	−0.9			I P W	69.7	70.0	+1.0	+0.1	70.4	+1.4	
27											"	70.3	70.0					

Astronl Date	Station	Instru mental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instru mental Position	Collimation C_0	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks
1880			d	d	d	d	d	d				d	d	d	d	d	d	
Dec. 11	BOMBAY (Telescope No 2)	IPE	50 5							DEESA (Telescope No 1)								
„ 13		„	47 9	75 0	−25 7	−26 6	71 6	−22 3	Mean C_0		IPE	57 7	60 0	−3 4	−4 2	51 6	+ 5 0	Mean C_0
„ 14		„	48 1	75 0	−25 7	−26 6	69 6	−20 3	d		„	56 6	60 0	−3 4	−4 2	62 7	− 6 1	d
„ 16		„	48 5	50 0	− 0 7	− 1 6	46 4	+ 2 9	IPE = 48 8		„	59 4	60 0	−3 4	−4 2	62 3	− 5 7	IPE = 57 9
„ 17		IPW	49 6	50 0	+ 0 7	− 0 2	57 3	+ 8 0	IPW = 49 7		IPW	54 6	60 0	+3 4	+2 6	59 4	+ 2 8	IPW = 55 2
„ 18		„	50 4	50 0	+ 0 7	− 0 2	51 1	+ 1 8	General Mean = 49 3		„	54 8	55 0	−1 6	−2 4	60 5	+ 3 9	General Mean = 56 6
„ 19		„	49 0	50 0	+ 0 7	− 0 2	52 3	+ 3 0			„	56 1	55 0	−1 6	−2 4	60 7	+ 4 1	
1881																		
Jan 1	DEESA (Telescope No 1)	IPW	56 4							KURRACHEE (Telescope No 2)								
„ 3			55 9															
„ 5		„	56 6	55 0	− 0 7	− 1 5	57 5	+ 1 8	Mean C_0		IPW	66 1	70 0	+5 8	+4 2	80 7	+34 4*	Mean C_0
„ 6		„	55 8	55 0	− 0 7	− 1 5	56 4	+ 0 7	d		„	63 0	65 0	0 0	−0 8	65 7	+ 0 7	d
7		„	55 1	55 0	− 0 7	− 1 5	56 3	+ 0 6	IPE = 55 3			66 1	65 0	0 0	−0 8	67 8	+ 2 8	IPE = 64 8
„ 8		IPE	55 8	55 0	+ 0 7	− 0 1	58 2	− 2 5	IPW = 56 0		IPE	64 1	65 0	0 0	−0 8	69 7	− 4 7	IPW = 65 1
„ 9			54 8	55 0	+ 0 7	− 0 1	56 7	− 1 0	General Mean = 55 7		„	65 5	65 0	0 0	−0 8	65 9	− 0 9	General Mean = 65 0
„ 10		„	55 4	55 0	+ 0 7	− 0 1	58 8	− 3 1			„	64 7	65 0	0 0	−0 8	67 1	− 2 1	
Jan 17	BOMBAY (Telescope No 1)	IPE	5 7	10 0	− 3 6	− 4 5	10 9	− 4 5	Mean C_0	KURRACHEE (Telescope No 2)	IPE	65 1	65 0	+0 8	0 0	65 3	+ 0 5	Mean C_0
„ 18		„	5 6	10 0	− 3 6	− 4 5	7 9	− 1 5	d		„	64 7	65 0	+0 8	0 0	63 8	+ 2 0	d
„ 19		„	5 8	10 0	− 3 6	− 4 5	3 9	+ 2 5	IPE = 5 7			65 2	65 0	+0 8	0 0	63 6	+ 2 2	IPE = 65 0
„ 20		IPW	6 7	10 0	+ 3 6	+ 2 7	11 8	+ 5 4	IPW = 7 0		IPW	65 6	65 0	−0 8	−1 6	72 9	+ 7 1	IPW = 66 5
„ 21		„	6 2	10 0	+ 3 6	+ 2 7	10 8	+ 4 4	General Mean = 6 4		„	67 3	65 0	−0 8	−1 6	66 4	+ 0 6	General Mean = 65 8
„ 23		„	7 4	10 0	+ 3 6	+ 2 7	5 6	− 0 8			„	66 6	65 0	−0 8	−1 6	69 2	+ 3 4	
„ 24		„	7 5															
Feb 6	JUBBULPORE (Telescope No 1)	IPE	16 6	15 0	+ 6 0	+ 5 2	14 4	+ 6 6		BOMBAY (Telescope No 2)	IPE	84 3	80 0	+5 3	+4 4	78 7	+ 6 6	
„ 7		„	20 4	15 0	+ 6 0	+205 2†	16 9	+ 4 1	Mean C_0		„	81 7	80 0	+5 3	+4 4	81 0	+ 4 3	Mean C_0
„ 8			21 5	15 0	+ 6 0	+ 5 2	17 2	+ 3 8	d		„	83 6	80 0	+5 3	+4 4	79 6	+ 5 7	d
„ 9		„	19 8	20 0	+ 1 0	+ 0 2	16 7	+ 4 3	IPE = 19 6		„	83 1	80 0	+5 3	+4 4	80 2	5 1	IPE = 83 2
„ 10		IPW	22 3	20 0	− 1 0	− 1 8	22 7	+ 1 7	IPW = 22 3		IPW	87 8	80 0	−5 3	−6 2	82 1	− 3 2	IPW = 87 3
„ 13		„	21 7	20 0	− 1 0	− 1 8	21 8	+ 0 8	General Mean = 21 0		„	86 3	80 0	−5 3	−6 2	91 8	+ 6 5	General Mean = 85 3
„ 14			22 8	20 0	− 1 0	− 1 8	20 6	− 0 4			„	87 8	80 0	−5 3	−6 2	90 8	+ 5 5	

* At Kurrachee on January 5th the reflection of the wrong wire in the mercury trough was observed by mistake causing an abnormally large correction for dislevelment † At Jubbulpore on February 7th the observations were accidentally made with a mistake of two revolutions in the setting of the micrometer

Astronl Date	Station	Instrumental Position	Collimation C_0	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks
1881			d	d	d	d	d	d				d	d	d	d	d	d	
Feb 23	JUBBULPORE (Telescope No. 1)	IPW	19 6	20 0	+1 8	+1 0	17 6	−0 6	Mean C_0	BOLARUM (Telescope No 2)	IPW	19 6	20 0	+4 0	+3 1	20 2	+4 2	Mean C_0
„ 24		,	20 6	20 0	+1 8	+1 0	17 0	−1 2	IPE = 16 5 d		„	17 3	20 0	+4 0	+3 1	21 4	+5 4	IPE = 13 8 d
„ 25		,	19 5	20 0	+1 8	+1 0	22 6	+4 4	IPW = 19 9		„	17 4	20 0	+4 0	+3 1	22 3	+6 3	IPW = 18 1
„ 28		IPE	16 5	20 0	−1 8	−2 6	20 7	−2 5	General Mean = 18 2		IPE	14 2	20 0	−4 0	−4 9	17 2	−1 2	General Mean = 16 0
Mar 2		„	15 9	20 0	−1 8	−2 6	19 7	−1 5			„	13 4	20 0	−4 0	−4 9	14 6	+1 4	
„ 3		„	16 9	20 0	−1 8	−2 6	19 3	−1 1			„	13 7	20 0	−4 0	−4 9	13 1	+2 9	
Mar 11	JUBBULPORE (Telescope No 2)	IPE	8 5	10 0	−0 8	−1 6	8 1	+1 1	Mean C_0	AGRA (Telescope No 1)	IPE	35 4	35 0	0 0	−0 8	35 3	−0 3	Mean C_0
„ 12		,	9 5	10 0	−0 8	−1 6	9 0	+0 2	IPE = 9 2 d		,	34 7	35 0	0 0	−0 8	35 8	−0 8	IPE = 34 4 d
„ 13		„	9 7	10 0	−0 8	−1 6	10 0	−0 8	IPW = 9 1		,	33 2	35 0	0 0	−0 8	35 6	−0 6	IPW = 35 5
„ 15		IPW	10 3	10 0	+0 8	0 0	10 6	+1 4	General Mean = 9 2		IPW	35 0	35 0	0 0	−0 8	35 0	0 0	General Mean = 35 0
„ 17		„	10 0	10 0	+0 8	0 0	10 8	+1 6			,	35 0	35 0	0 0	−0 8	35 3	+0 3	
„ 20		„	8 0	10 0	+0 8	0 0	5 9	−3 3			,	34 7	35 0	0 0	−0 8	33 8	−1 2	
„ 21		„	8 0	10 0	+0 8	0 0	5 2	−4 0			„	37 1	35 0	0 0	−0 8	35 2	+0 2	
Mar 28	JUBBULPORE (Telescope No 2)	IPW	8 1	10 0	+4 7	+3 9	10 6	+5 3	Mean C_0	DEESA (Telescope No 1)	IPW	23 9	20 0	−1 8	−2 6	20 8	−1 0	Mean C_0
„ 29		„	8 1	10 0	+4 7	+3 9	11 0	+5 7	IPE = 2 3 d		,	22 6	20 0	−1 8	−2 6	21 2	−0 6	IPE = 20 3 d
„ 30		„	8 8	10 0	+4 7	+3 9	10 4	+5 1	IPW = 8 3		,	23 2	20 0	−1 8	−2 6	18 9	−2 9	IPW = 23 2
31		IPE	2 1	10 0	−4 7	−5 5	4 5	+0 8	General Mean = 5 3		IPE	19 7	20 0	+1 8	+1 0	21 0	+0 8	General Mean = 21 8
Apr 1			2 5	10 0	−4 7	−5 5	8 9	−3 6			„	20 5	20 0	+1 8	+1 0	21 6	+0 2	
„ 3		„	2 2	10 0	−4 7	−5 5	6 8	−1 5			,	20 8	20 0	+1 8	+1 0	22 8	−1 0	
Apr 10	AGRA (Telescope No 2)	IPE	74 3	75 0	+2 4	+1 6	74 5	+2 9	Mean C_0	DEESA (Telescope No 1)	IPE	29 7	30 0	−1 3	−2 1	29 7	−1 0	Mean C_0
11		,	74 8	75 0	+2 4	+1 6	74 4	+3 0	IPE = 74 6 d		„	27 2	30 0	−1 3	−2 1	28 6	+0 1	IPE = 28 8 d
„ 13		„	74 8	75 0	+2 4	+1 6	69 0	+8 4	IPW = 80 1		„	29 5	30 0	−1 3	−2 1	27 9	+0 8	IPW = 28 6
„ 14		IPW	79 9	80 0	+2 6	+1 8	79 4	+2 0	General Mean = 77 4		IPW	28 5	30 0	+1 3	+0 5	30 5	−8 2	General Mean = 28 7
„ 15		,	80 3	80 0	+2 6	+1 8	80 0	+2 6			„	29 6	30 0	+1 3	+0 5	31 9	+3 2	
„ 16		,	80 0	80 0	+2 6	+1 8	82 1	+4 7			„	27 7	30 0	+1 3	+0 5	30 8	+2 1	

Astronl. Date	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks
1877			d	d	d	d	d	d				d	d	d	d	d	d	
Apr 25	BOMBAY (Telescope No. 1)	I.P.E	85 8							ADEN (Telescope No. 2)	I.P.E	68 2						
" 26		"	86 3								"	70 5						
" 27											"	68 9						
" 28		"	84 2								"	70 4						
" 29		"	82 3	85 0	−0 5	−1 4	81 9	+2 6										
" 30		"	84 4	85 0	−0 5	−1 4	81 6	+2 9			"	68 8	70 0	−0 4	−1 3	65 4	+4 2	
May 1		I P W	84 0	85 0	+0 5	−0 4	83 5	−1 0			I P W	70 7	70 0	+0 4	−0 5	67 3	−2 3	
" 2		"	83 7	85 0	+0 5	−0 4	82 9	−1 4			"	69 9	70 0	+0 4	−0 5	69 9	+0 3	
							83 3		Mean C_0									Mean C_0
" 3		"	81 7	85 0	+0 5	−0 4	83 3	−1 0	I P.E = 84·7		"	70 7	70 0	+0 4	−0 5	70 1	+0 5	I.P.E = 69 0
							83 8		I P W = 84 3									I P W. = 70 1
" 4		"	82 9	85 0	+0 5	−0 4	84 5	−0 2	General Mean = 84 5		"	69 5	70 0	+0 4	−0 5	70 6	+1 0	General Mean = 69 6
							84 2											
" 5		I P E	83 7	85 0	−0 5	−1 4	84 9	−0 4			"		70 0	+0 4	−0 5	72 6	+3 0	
" 6											"	69 6	70 0	+0 4	−0 5	73 2	+3 6	
" 7		"	85 9	85 0	−0 5	−1 4	85 3	−0 9			I P E	68 6	70 0	−0 4	−1 3	62 3	+7 3	
							85 4											
" 8		I.P W	86 4	85 0	+0 5	−0 4	88 1	+3 6			"	68 8	70 0	−0 4	−1 3	70 2	−0 6	
							88 0											
" 9		"	84 5	85 0	+0 5	−0 4	85 4	+1 2			"	68 0	70 0	−0 4	−1 3	69 0	+0 6	
							86 0											
May 23	ADEN (Telescope No. 1)									SUEZ (Telescope No 2)	I P E?	74 5						
" 25		I P E	41 1	40 0	+1 5	+0 6	34 3	+7 4			"	75 2	75 0	+1 9	+1·1	101 7	−24·8	
							34 0											
" 26		"	41 5	40 0	+1 5	+0 6	44 0	−2 0			"	73 3	75 0	+1 9	+1 1	77 6	−0 7	
							43 0		Mean C_0									Mean C_0
" 27		"	42 1	40 0	+1 5	+0 6	42 1	−0 6	I P E = 41 6		"	74 2	75 0	+1 9	+1 1	75 9	+1 0	I P E = 74 3
							42 0		I.P W = 41 4									I.P W. = 79 5
" 28		I.P W	42 5	40 0	−1 5	−2 4	41 0	+0 1	General Mean = 41 5		I.P W	78 7	75 0	−1 9	−2 7	74 2	−2 7	General Mean = 76 9
							42 2											
" 29		"	40 6	40 0	−1 5	−2 4	39 4	−2 2			"	79 3	75 0	−1 9	−2 7	75 9	−1 0	
							39 2											
" 30		"	41·1	40 0	−1 5	−2 4	39 8	−1 7			"	80 0	75 0	−1 9	−2 7	74 0	−2 9	
							39 8					80 0	75 0					

Astronl. Date	Station	Instrumental Position	Collimation				Level		Remarks	Station	Instrumental Position	Collimation				Level		Remarks
			C_0	C	c_1	c	M	b				C_0	C_s	c_1	c	M	b	
1882			d	d	d	d	d	d				d	d	d	d	d	d	
Dec. 2	JALPAIGURI (Telescope No. 2)	I P E	31 7	32 7	−2 2	−3 0	33 7	−1 5		FYZABAD (Telescope No 1)	I P.E	30 0	30 0	−0 2	−1 0	31 5	− 2 6	
			32 7	32 7			33 1					29 6	30 0			32 4		
			30 2	32 7								29 9	30 0			33 2		
" 4		I P W	35 0	35 0	−0 1	−0 9	34 4	0 0			I P W	30 1	30 0	+0 2	−0 6	35 0	+ 5 7	
			36 1	35 0			34 7					29 6	30 0			35 9		
			36 1	35 0			35 6											
" 5		I P E	35 3	35 3	+0 4	−0 4	36 0	+0 3			I P E	29 9	30 0	−0 2	−1 0	18 0	+12 0	
			34 9	35 3			34 7					29 7	30 0			17 6		
			35 1	35 3			34 9											
" 6		I P W	36 4	36 4	−1 5	−2 3	35 6	+0 2	Mean C_0		I P W	29 5	30 0	+0 2	−0 6	28 7	− 0 3	Mean C_0
			35 1	36 4			33 9		d IP.E = 34 8			29 9	30 0			30 3		d I P E = 29 6
			35 7	36 4			34 5		I P W = 35 0									I P W = 30 0
" 7		I P E	39 2	39 2	+4 3	+3 5	41 5	+4 9	General Mean = 34 9		I P E	28 9	30 0	−0 2	−1 0	26 7	+ 1 3	General Mean = 29 8
			35 2	39 2			38 8					29 3	30 0			28 8		
			35 7	39 2			39 2					30 0	30 0			29 9		
" 8		IP W	35 5	35 5	−0 6	−1 4	35 5	−0 4			I P W	29 9	30 0	+0 2	−0 6	29 2	− 0 5	
			33 9	35 5			35 2					29 9	30 0			29 3		
			34 6	35 5			35 2											
" 9		I P E	36 6	36 6	+1 7	+0 9	37 6	+1 1			I P E	29 7	30 0	−0 2	−1 0	30 3	− 1 0	
			35 7	36 6			35 4					29 3	30 0			31 2		
			35 6	36 6			35 0											
" 11		I P W	35 0	35 0	−0 1	−0 9	34 7	+0 6			I P W	30 8	30 0	+0 2	−0 6	28 6	− 0 6	
			33 9	35 0			34 1					30 6	30 0			29 7		
			32 7	35 0			34 1											
Dec. 21	JALPAIGURI (Telescope No 2)	I P W	32 0	32 0	+0 4	−0 4	31 0	+1 1		CALCUTTA (Telescope No 1)	I P W	22 7	25 0	+1 6	+0 8	23 4*	0 0	
			34 9	32 0			31 5					21 6	25 0					
			33 1	32 0														
" 26		I P E	31 0	31 0	−1 4	−2 2	31 3	−0 7			I P E	26 5	25 0	−1 6	−2 4	25 0	− 2 2	
			28 3	31 0			32 1					25 7	25 0			26 1		
			29 5	31 0														
" 27		I.P W	36 5	36 5	−4 1	−4 9	37 1	−4 9	Mean C_0		I P W	21 6	25 0	+1 6	+0 8	24 5	+ 1 9	Mean C_0
			35 6	36 5			37 5		d I P E = 30 2			18 8	25 0			26 0		d I P E = 25 4
" 28		I P E	31 2	31 2	−1 2	−2 0	31 1	−2 0	I P W = 34 6		I P.E	26 8	25 0	−1 6	−2 4	22 3	+ 2 4	I P W = 21 4
			28 4	31 2			29 6		General Mean = 32 4			28 2	25 0			19 7		General Mean = 23 4
" 29		I.P W	35 9	35 9	−3 5	−4 3	36 5	−3 4			I P W	20 9	25 0	+1 6	+0 8	26 9	+ 4 0	
			34 3	35 9			35 0					22 7	25 0			27 9		
1883 Jan. 2		I.P.E	31 2	31 2	−1 2	−2 0	31 0	−2 1			I P.E	22 8	25 0	−1 6	−2 4	27 2	− 4 3	
			31 5	31 2			29 6					25 4	25 0			28 2		
												22 7	25 0					

* Owing to the tremor of the ground in Calcutta caused by passing vehicles, the value of M could not, sometimes, be determined until late in the night.

Astronl. Date	Station	Instrumental Position	Collimation C_0	C_s	c_1	c	Level M	b	Remarks	Station	Instrumental Position	Collimation C_0	C_s	c_1	c	Level M	b	Remarks
1888			d	d	d	d	d	d				d	d	d	d	d	d	
Jan 12	CHITTAGONG (Telescope No 1)	I.P.E	3 2 5 1	5 0 5 0	0 0	−0 9	2 5 3 1 2 7	+2 2		JALPAIGURI (Telescope No 2)	I.P.E	31 2 30 8	31 2 31 2	−0 5	−1 3	31 2 30 1	−1 0	
„ 13		IPW	3 8 5 3	5 0 5 0	0 0	−0 9	1 3 2 0	−3 3			IPW	34 5 31 1	34 5 34 5	−2 8	−3 6	35 1 36 1	−3 9	
„ 14		I.P.E	5 1 5 7	5 0 5 0	0 0	−0 9	3 3 4 0	+1 3	Mean C_0 d I.P.E = 4 5 IPW = 5 5 General Mean = 5 0		IPE	32 4 32 6	32 4 32 4	+0 7	−0 1	32 8 32 3	+0 9	Mean C_0 d I.P.E = 32 2 IPW = 31 2 General Mean = 31 7
„ 15		IPW	7 1 7 4	5 0 5 0	0 0	−0 9	3 7 6 0	−0 1			IPW	31 2 31 0	31 0 31 0	+0 7	−0 1	31 7 31 5	+0 1	
„ 17		IPE	3 8 4 3	5 0 5 0	0 0	−0 9	4 7 4 0	+0 6			IPE	34 6 31 7	34 0 34 0	+2 3	+1 5	34 7 35 1	+3 2	
„ 18		IPW	3 7 5 8	5 0 5 0	0 0	−0 9	4 6 6 0	+0 3			IPW	30 1 29 5	80 0 30 0	+1 7	+0 9	31 2 29 6	+1 3	
Jan 23	CHITTAGONG (Telescope No. 1)	IPW	5 4 4 4	5 0 5 0	+0 4	−0 5	2 2 3 2	−1 9		CALCUTTA (Telescope No 2)	IPW	22 4 21 0	22 0 22 0	+0 8	0 0	25 3 25 4	−2 6	
„ 24		IPE	5 0 6 6	5 0 5 0	−0 4	−1 3	4 0 4 8	+0 2			IPE	28 3 23 2 25 7	28 0 28 0 28 0	+5 2	+4 4	32 5 32 2	+9 6	
„ 25		IPW	3 7 4 4	5 0 5 0	+0 4	−0 5	4 9 4 9	+0 3			IPW	24 2 23 8	24 0 24 0	−1 2	−2 0	22 9 20 5	+1 1	
„ 26		IPE	3 4 4 8	5 0 5 0	−0 4	−1 3	3 8 6 1	−0 4	Mean C_0 d IPE = 4 5 IPW = 4 7 General Mean = 4 6		IPE	20 6 21 8	21 0 21 0	−1 8	−2 6	31 9 31 0	+8 7	Mean C_0 d IPE = 23 3 IPW = 22 3 General Mean = 22 8
„ 28		IPW	3 8 4 2	5 0 5 0	+0 4	−0 5	2 7 2 6	−1 9			IPW	18 9 23 5 20 1	19 0 19 0 19 0	+3 8	+3 0	19 3 18 6 19 5	+3 7	
„ 29		I.P.E	3 0 4 4	5 0 5 0	−0 4	−1 3	3 3 3 5	+1 2			IPE	23 3 20 5 22 9	23 0 23 0 23 0	+0 2	−0 6	24 6 22 9 24 9	+1 3	
„ 30		IPW	5 6 6 2	5 0 5 0	+0 4	−0 5	5 4 6 0	+1 1			IPW	22 8 23 8 22 6 21 6	23 0 23 0 23 0 23 0	−0 2	−1 0	24 5 23 5 23 5	−1 0	

Astronl. Date	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks
1883			d	d	d	d	d	d				d	d	d	d	d	d	
Feb 8	CALCUTTA (Telescope No 1)	I.P.E	5 3 7 4	5 0 5 0	+2 4	+1 5	3 2 2 9	+4 3		FYZABAD (Telescope No. 2)	I P E	47 5 46 6 47 3	47 0 47 0 47 0	+0 2	−0 6	45 9 44 9 45 1	−1 5	
" 9		I P W	6 2 7 5	5 0 5 0	−2 4	−3 3	12 1 5 1 5 2	+0 1			I P W	45 7 47 2 45 6	47 0 47 0 47 0	−0 2	−1 0	50 0 50 9 49 9	−3 5	
" 10		I P E	6 6 6 6	5 0 15 0	+2 4 −7 6	+1 5* −8 5†	12 6 12 9	−5 4	Mean C_0 d I P E = 6 8 I.P W = 7 9 General Mean = 7 4		I P E	48 2 47 4 46 5	47 0 47 0 47 0	+0 2	−0 6	44 7 45 0 44 4	−2 1	Mean C_0 d I P E = 47 4 I P W = 46 2 General Mean = 46 8
" 11		I P W	8 1 7 9 8 6	5 0 5 0 5 0	−2 4	−3 3	2 8 3 8	−4 1			I P W	48 0 46 1 45 7 46 1	47 0 47 0 47 0 47 0	−0 2	−1 0	51 5 50 9 50 6	−4 2	
" 13		I P E	6 9 7 8	5 0 5 0	+2 4	+1 5	13 1 12 3	−5 3			I P E	48 0 48 7 46 7	47 0 47 0 47 0	+0 2	−0 6	46 6 46 7 47 5	+0 1	
" 14		I P W	9 1 8 1	5 0 5 0	−2 4	−3 3	6 5 4 3	−2 0			I P W	46 5 45 6 45 4	47 0 47 0 47 0	−0 2	−1 0	41 1 40 5 40 3	+6 2	
Feb 22	CALCUTTA (Telescope No 1)	I P W	307 1 306 5	305 0 305 0	−2 7	−3 6	305 9 305 9	−1 8		JUBBULPORE (Telescope No 2)	I P W	20 8 21 9 21 7	22 0 22 0 22 0	+0 3	−0 5	20 2 20 7 21 0	+1 7	
" 23		I P.E	307 3 308 5	305 0 305 0	+2 7	+1 8	310 1 311 5	−3 1			I P E	23 8 23 3 22 2	23 0 23 0 23 0	+0 7	−0 1	22 1 21 9 20 7	−0 7	
" 24		I P W	306 4 309 3	305 0 305 0	−2 7	−3 6	302 4 303 2	−4 9	Mean C_0 d I P E = 308 4 I P W = 307 0 General Mean = 307 7		I P W	22 5 20 9 21 7	22 0 22 0 22 0	+0 3	−0 5	21 9 22 4 22 8	−0 1	Mean C_0 d I P.E = 22 4 I P W = 22 2 General Mean = 22 3
" 28		I P E	309 8 307 6	305 0 305 0	+2 7	+1 8	300 3 298 3	+8 4			I P E	22 0 23 4 22 7	22 0 22 0 22 0	−0 3	−1 1	23 7 24 2 22 9	+1 3	
Mar 2		I P W	306 4 306 2	305 0 305 0	−2 7	−3 6	312 2 312 2	+4 5			I P W	24 5 22 1 23 4	23 0 23 0 23 0	−0 7	−1 5	21 1 21 6 21 3	+1 0	
" 3		I P E	308 5 308 5	305 0 305 0	+2 7	+1 8	299 3 299 6	+8 2			I P E	20 9 21 3 22 1	21 0 21 0 21 0	−1 3	−2 2	21 2 21 3 21 4	−1 0	

* For all stars up to No 3068. † For subsequent stars.

Astronl. Date	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks
1888			d	d	d	d	d	d				d	d	d	d	d	d	
Mar 14	FYZABAD (Telescope No 1)	*IPE*	302 8	300 0	−0 3	−1 1	298 1	+1 5		JUBBULPORE (Telescope No. 2)	*IPE*	22 7	23 0	+1 2	+0 4	23 0	+1 3	
			301 5	300 0			298 3					20 4	23 0			23 1		
			302 9	300 0								23 0	23 0			23 3		
„ 15		*IPW*	299 1	300 0	+0 3	−0 5	308 4	+8 7			*IPW*	20 1	21 0	+0 8	0 0	19 2	+2 8	
			299 9	300 0			308 3					19 3	21 0			19 6		
												18 5	21 0			18 2		
„ 16		*IPE*	301 7	300 0	−0 3	−1 1	298 9	+0 5			*IPE*	23 7	24 0	+2 2	+1 4	22 8	−0 3	
			301 3	300 0			299 5					21 9	24 0			20 8		
									Mean C_0			22 1	24 0			20 9		Mean C_0
„ 17		*IPW*	298 4	300 0	+0 3	−0 5	297 8	−1 5	d *IPE* = 309 8		*IPW*	22 5	22 0	−0 2	−1 0	22 6	−0 4	d *IP.E* = 23 0
			299 5	300 0			298 5		*IPW* = 298 6			20 8	22 0			23 1		*IPW* = 20 5
									General Mean = 299 7			20 4	22 0			20 9		General Mean = 21 8
„ 18		*IPE*	299 7	300 0	−0 3	−1 1	301 6	−0 9			*IPE*	24 8	25 0	+3 2	+2 4	24 9	+2 5	
			299 3	300 0			299 5					23 7	25 0			23 9		
												23 0	25 0			24 1		
„ 19		*IPW*	297 2	300 0	+0 3	−0 5	305 1	+7 5			*IPW*	21 6	21 0	+0 8	0 0	20 8	+0 7	
			298 0	300 0			307 9					21 3	21 0			21 1		
							308 5					20 4	21 0			21 3		
„ 20		*IPE*	298 3	300 0	−0 3	−1 1	297 2	+2 2			*IPE*	24 4	25 0	+3 2	+2 4	24 0	+1 5	
			299 5	300 0			297 9					23 9	25 0			23 7		
							297 4					21 9	25 0			22 2		
Mar 28	FYZABAD (Telescope No 1)	*IPE*	303 3	300 0	+0 8	0 0	296 4	+5 4		AGRA (Telescope No 2)	*IPE*	40 7	41 0	+0 7	−0 1	40 6	−0 3	
			301 6	300 0			294 8					39 2	41 0			39 7		
			302 2	300 0			295 0					39 4	41 0			39 7		
„ 29		*IPW*	300 7	300 0	−0 8	−1 6	300 2	+0 6			*IPW*	42 1	42 0	−1 7	−2 5	42 6	−1 9	
			300 8	300 0			301 2					40 0	42 0			41 8		
							302 8											
„ 30		*IPE*	301 4	300 0	+0 8	0 0	301 4	−1 6	Mean C_0		*IPE*	39 4	40 0	−0 3	−1 1	39 1	−1 9	Mean C_0
			300 8	300 0			303 0		d			40 5	40 0			38 0		d
							302 7		*IPE* = 301 8			40 5	40 0			38 1		*IPE* = 39 3
„ 31		*IPW*	298 0	300 0	−0 8	−1 6	305 9	+5 4	*IPW* = 299 8		*IPW*	42 5	42 0	−1 7	−2 5	42 7	−1 8	*IPW* = 41 2
			299 2	300 0			306 5		General Mean = 300 8			41 5	42 0			41 7		General Mean = 40 3
												41 8	42 0			41 9		
Apr 3		*IPE*	301 0	300 0	+0 8	0 0	297 7	+3 3			*IPE*	37 6	39 0	−1 3	−2 1	36 5	−4 7	
			302 0	300 0			297 3					38 1	39 0			36 3		
												38 0	39 0			34 0		
„ 4		*IPW*	299 9	300 0	−0 8	−1 6	301 3	+1 4			*IPW*	40 0	39 0	+1 3	+0 5	40 4	+0 1	
			300 1	300 0			302 4					41 0	39 0			40 0		
							303 0					40 9	39 0			40 1		

Astronl Date	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks
1883			d	d	d	d	d	d				d	d	d	d	d	d	
Nov 27	AKYAB (Telescope No 1)	I P E	97 2 101 1 98 8	100 0 100 0 100 0	−2 7	−3 6	97 9 99 0 97 7	−0 9		CALCUTTA (Telescope No 2)	I P E	17 8 17 7	20 0 20 0	+4 4	+3 6	16 7 14 6	+0 1	
Dec. 8		I P W	100 2 99 3	100 0 100 0	+2 7	+1 8	97 4 99 1 98 0	+0 9			I P E	16 9 17 3	20 0 20 0	+4 4	+3 6	21 3 22 4	+6 3	
" 9		I P W	98 7 98 8	100 0 100 0	+2 7	+1 8	95 6 95 3 96 7	−1 4			I P W	13 0 13 6	20 0 20 0	−4 4	−5 2	10 6 11 1	+4 7	
" 10		I P E	97 0 95 8	100 0 100 0	−2 7	−3 6	99 7 99 6 100 0	−2 5	Mean C_0 I P E = 97 2 d I P W = 97 4 General Mean = 97 3		I P W	15 1 13 7	15 0 15 0	+0 6	−0 2	8 3 14 5	+4 2	Mean C_0 I P E = 16 6 d I P W = 14 6 General Mean = 15 6
" 11		I P E	95 6 97 3	100 0 100 0	−2 7	−3 6	95 5 96 9 96 9	+0 9			I P E	17 1 15 0	15 0 15 0	−0 6	−1 4	22 6 22 9	+7 2	
" 12		I P W	94 9 95 6 96 8	100 0 100 0 100 0	+2 7	+1 8	99 8 98 6	+1 9			I P E	15 4 15 3	15 0 15 0	−0 6	−1 4	13 2 11 2	−3 4	
" 13		I P W	96 3 96 4	100 0 100 0	+2 7	+1 8	98 8 98 9	+1 6			I P W	14 3 13 6	15 0 15 0	+0 6	−0 2	15 8 15 7	−0 2	
" 14		I P E	97 0 94 7	95 0 95 0	+2 3	+1 4	94 6 95 3	+2 3			I P W	14 6 18 5	15 0 15 0	+0 6	−0 2	17 5 17 3	−1 8	
Dec 26	AKYAB (Telescope No 1)	I P E	96 9 96 1	95 0 95 0	+1 8	+0 9	97 6 98 9	−1 5		CHITTAGONG (Telescope No 2)	I P E	27 3 25 1	30 0 30 0	+4 6	+3 7	27 8 26 6	+1 8	
" 27		I P W	98 7 95 7	100 0 100 0	+3 2	+2 3	95 2 93 4	−2 5			I P E	27 0 25 9	30 0 30 0	+4 6	+3 7	25 7 25 6	+0 3	
" 28		I P W	97 0 95 9	95 0 95 0	−1 8	−2 7	95 0 95 1	−1 7			I P W	23 7 24 7	25 0 25 0	+0 4	−0 5	24 9 24 1	+0 9	
" 29		I P E	96 7 97 4	95 0 95 0	+1 8	+0 9	96 8 97 6	−0 4	Mean C_0 I P E = 97 4 d I P W = 96 2 General Mean = 96 8		I P W	24 8 24 3	25 0 25 0	+0 4	−0 5	24 0 24 3	+1 2	Mean C_0 I P E = 26 0 d I P W = 24 7 General Mean = 25 4
" 30		I P E	96 6 96 6	95 0 95 0	+1 8	+0 9	96 9 98 2	−0 8			I P E	26 7 24 4	25 0 25 0	−0 4	−1 3	27 0 27 4	+1 8	
1884 Jan 2		I P W	95 0 96 5	95 0 95 0	−1 8	−2 7	92 9 94 4	−3 1			I P E	25 5 26 0	25 0 25 0	−0 4	−1 3	24 9 23 9	−1 0	
" 3		I P W	95 8 95 2	95 0 95 0	−1 8	−2 7	95 6 95 8	−1 1			I P W	25 1 24 9	25 0 25 0	+0 4	−0 5	26 4 25 9	−0 8	
" 4		I P E	98 8 99 8	95 0 95 0	+1 8	+0 9	98 7 99 5	−2 3			I P W	24 7 25 6	25 0 25 0	+0 4	−0 5	26 3 25 4	−0 5	

Astronl. Date	Station	Instrumental Position	Collimation C_0	Collimation C	Collimation e_1	Collimation e	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation e_1	Collimation e	Level M	Level b	Remarks
			d	d	d	d	d	d				d	d	d	d	d	d	
1884 Jan. 21	PROME (Telescope No 1)	I P W	98 1	100 0	−0 5	−1 4	94 2 93 7	−6 5		CHITTAGONG (Telescope No 2)	I P W	25 9 24 7	25 0 25 0	+0 9	0 0	25 8 23 6	+1 2	
		I P E	97 2	100 0	+0 5	−0 4	102 2 104 1	−2 7										
„ 22		I P E	96 3	95 0	+5 5	+4 6	99 9	+0 6			I P E	27 4 25 6	25 0 25 0	−0 9	−1 8	31 9 31 7	+5 9	
		I P W	100 3	95 0	−5 5	−6 4	94 1 94 6	−6 1										
„ 23		I P W	101 9	100 0	−0 5	−1 4	95 8	−4 7			I P W	26 6 26 5	25 0 25 0	+0 9	0 0	24 4 23 2	+2 1	
		I P E	103 2 100 4	100 0 100 0	+0 5	−0 4	104 4 106 1	−4 8										
„ 24		I P E	101 0	100 0	+0 5	−0 4	97 1 94 8	+4 5	Mean C_0 (d) I P E = 100 1 I P W = 100 9 General Mean = 100 5		I P E	26 0 26 3	25 0 25 0	−0 9	−1 8	34 1 33 3	+7 8	Mean C_0 (d) I P E = 25 9 I P W = 25 9 General Mean = 25 9
		I P W	102 4 100 9	100 0 100 0	−0 5	−1 4	107 4 104 2	+5 3										
„ 25		I P W	103 0	100 0	−0 5	−1 4	106 1 106 1	+5 6			I P W	26 9 26 6	25 0 25 0	+0 9	0 0	23 3 23 5	+2 5	
		I P E	102 4 103 3	100 0 100 0	+0 5	−0 4	98 0 97 6	+2 7										
„ 26		I P E	98 4 98 8	100 0 100 0	0 5	−0 4	94 5 96 7	+4 9			I P E	25 7 25 5	25 0 25 0	−0 9	−1 8	25 6 24 9	−0 6	
		I P W	99 0 101 1	100 0 100 0	−0 5	−1 4	99 9 100 5	−0 3										
„ 29		I P W	102 6 100 6	100 0 100 0	−0 5	−1 4	97 1 97 0	−3 4			I P W	25 0 25 3	25 0 25 0	+0 9	0 0	32 0 28 0	−4 1	
		I P E	100 2 100 9	100 0 100 0	+0 5	−0 4	109 0 109 7	−8 9										
„ 30		I P E	100 1 99 5	100 0 100 0	+0 5	−0 4	96 4 98 8	+2 9			I P E	25 3 25 2	25 0 25 0	−0 9	−1 8	26 7 26 3	+0 6	
		I P W	100 9 99 8	100 0 100 0	−0 5	−1 4	105 9 105 9	+5 4										
Feb. 8	PROME (Telescope No 1)	I P E	100 4 101 8	100 0 100 0	+0 9	0 0	99 9 101 9	0 0		AKYAB (Telescope No 2)	I P E	21 6 21 5	22 0 22 0	+0 9	0 0	22 3 20 9	+0 5	
		I P W	101 4 102 9	100 0 100 0	−0 9	−1 8	100 3 99 9	−0 8										
„ 9		I P W	101 8 102 1	100 0 100 0	−0 9	−1 8	100 8 100 5	−0 2			I P W	20 3 19 7	22 0 22 0	−0 9	−1 8	23 3 23 2	−2 2	
		I P E	99 3 99 7	100 0 100 0	+0 9	0 0	104 1 105 7	−4 0										

Astronl. Date	Station	Instrumental Position	Collimation C_0	Collimation C	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks
			d	d	d	d	d	d				d	d	d	d	d	d	
1884 Feb 12	PROME (Telescope No 1)—(Continued)	*IPE*	101 8	100 0	+0 9	0 0	95 6	+ 4 8		AKYAB (Telescope No 2)—(Continued)	*IPE*	21 8	22 0	+0 9	0 0	20 3	−1 1	
			101 1	100 0			96 6		Mean C_0 d			22 4	22 0			19 7		Mean C_0 d
		IPW	99 7	100 0	−0 9	−1 8	105 3	+ 4 6	*IPE* = 100 8									*IPE* = 21 8
			99 3	100 0			105 6		*IPW* = 101 0									*I.PW* = 20 3
,, 13		*IPW*	99 9	100 0	−0 9	−1 8	94 4	− 6 3	General Mean = 100 9		*IPW*	19 9	22 0	−0 9	−1 8	25 5	−4 9	General Mean = 21 1
			100 9	100 0			94 8					21 2	22 0			26 4		
		IPE	100 6	100 0	+0 9	0 0	111 9	−11 4										
			101 8	100 0			112 6											
Mar 8	MOULMEIN (Telescope No. 2)	*IPE*	39 9	40 0	−2 2	−3 1	41 1	− 1 1		PROME (Telescope No 1)	*IPW*	99 8	100 0	−0 7	−1 6	99 0	−1 8	
																98 8		
,, 9		*IPW*	44 1	45 0	−2 8	−3 7	46 3	− 4 6			*IPW*	102 2	100 0	−0 7	−1 6	99 1	−2 2	
			42 2	45 0			47 2					101 1	100 0			97 9		
,, 10		*IPW*	43 2	45 0	−2 8	−3 7	45 6	− 3 4			*IPE*	97 8	100 0	+0 7	−0 2	99 6	+0 2	
		IPE	40 1	45 0	+2 8	+1 9	39 2	− 3 0				99 4	100 0			100 4		
												99 0	100 0			101 5		
,, 11		*IPE*	40 2	40 0	−2 2	−3 1	40 3	− 2 9			*IPW*	101 5	100 0	−0 7	−1 6	98 5	−2 3	
			40 4	40 0			38 3					101 2	100 0			98 4		
		IPW	42 6	40 0	+2 2	+1 3	45 5	− 3 3				101 3	100 0			98 4		
			43 1	40 0			45 5											
,, 12		*IPW*	43 7	40 0	+2 2	+1 3	45 0	− 3 2	Mean C_0 d		*IPE*	101 3	100 0	+0	−0 2	97 3	+2 2	Mean C_0 d
			43 9	40 0			45 8		*IPE* = 40 9			101 1	100 0			98 8		*IPE* = 100 1
		IPE	40 6	40 0	−2 2	−3 1	40 0	− 2 2	*IPW* = 43 5			101 0	100 0			99 3		*IPW* = 101 3
			40 2	40 0			39 9		General Mean = 42 2			102 0	100 0					General Mean = 100 7
,, 13		*IPE*	39 3	40 0	−2 2	−3 1	42 6	− 0 5			*IPW*	102 5	100 0	−0 7	−1 6	106 2	+7 0	
			40 8	40 0			40 8					101 0	100 0			107 9		
		IPW	46 3	40 0	+2 2	+1 3	42 8	− 0 4				101 8	100 0			108 9		
			44 4	40 0			42 3											
,, 14		*IPW*	42 4	40 0	+2 2	+1 3	42 3	− 0 5			*IPE*	100 4	100 0	+0 7	−0 2	97 1	+3 3	
			44 1	40 0			43 0					99 1	100 0			96 9		
		IPE	44 6	40 0	−2 2	−3 1	42 9	+ 0 5				99 9	100 0			98 2		
			42 5	40 0			42 4											
,, 15		*IPE*	40 5	40 0	−2 2	−3 1	43 9	+ 1 4			*IPW*	101 1	100 0	−0 7	−1 6	98 5	−3 0	
			42 0	40 0			43 2					102 2	100 0			97 5		
		IPW	44 3	40 0	+2 2	+1 3	42 1	− 0 2				100 9	100 0			97 1		
			41 2	40 0			42 7											

Astronl. Date	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks	Station	Instrumental Position	Collimation C_0	Collimation C_s	Collimation c_1	Collimation c	Level M	Level b	Remarks
1884			d	d	d	d	d	d				d	d	d	d	d	d	
Mar. 26	MOULMEIN (Telescope No 2)	I.P E.	41 7	42 0	0 0	−0 9	40 2	−2 3		AKYAB (Telescope No 1)	I P E	90 1	90 0	−0 6	−1 5	88 5	+0 7	
			40 9	42 0			39 2					90 5	90 0			89·0		
																88 8		
		I P W	42 4	42 0	0 0	−0 9	44 7	−3 5										
			42 2	42 0			46 3											
,, 27		I P W	44 6	42 0*	0 0	−0 9	43 2	−2 1			I.P W	89 1	90 0	+0 6	−0 3	86 0	−3 0	
			43 8	42 0			45 0					89 2	90 0			86 7		
												89 5	90 0			86 4		
		I P E	41 1	42 0	0 0	−0 9	41 4	−1 3										
			39 8	42 0			40 0											
,, 28		I P E	40 6	42 0	0 0	−0 9	42 3	0 0			I P E	89 2	90 0	−0 6	−1 5	91 1	−1 4	
			40 9	42 0			41 7					89 1	90 0			90 3		
																91 1		
		I P W	42 5	42 0	0 0	−0 9	43 7	−1 8										
			44 1	42 0			43 9											
,, 29		I P W	44 1	42 0	0 0	−0 9	43 0	−1 5	Mean C_0 d		I P W	88 7	90 0	+0 6	−0 3	89 7	+0 1	Mean C_0 d
			44 2	42 0			43 9		I P E = 40 8			87 9	90 0			90 1		I P E = 89 9
									I P W = 43 2							88 6		I.P W = 88 9
		I P E	40 2	42 0	0 0	−0 9	40 6	−1 3	General Mean = 42 0									General Mean = 89 4
			39 9	42 0			40 7											
,, 30		I P E	42 8	42 0	0 0	−0 9	42 1	0 0			I P E	89 7	90 0	−0 6	−1 5	91 1	−2 1	
			40 9	42 0			41 8					91 7	90 0			91 8		
		I P W	43 1	42 0	0 0	−0 9	42 0	−0 3										
			43 0	42 0			42 6											
,, 31		I P W	42 7	42 0	0 0	−0 9	42 7	−0 7			I P W	88 8	90 0	+0 6	−0 3	89 3	−0 2	
			43 0	42 0			42 7					89 3	90 0			89 1		
		I P E	41 0	42 0	0 0	−0 9	41 2	−0 8										
			40 2	42 0			41 2											
Apr 1		I P E.	41 0	42 0	0 0	−0 9	42 0	−0 7			I P E.	89 4	90 0	−0 6	−1 5	90 3	−1 7	
			39 7	42 0			40 5					89 4	90 0			91 9		
		I P W	43 5	42 0	0 0	−0 9	42 4	−0 2										
			41 2	42 0			42 0											

* Except for Star No. 2200 for which C_s = 7· —

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

BELLARY (E), AND BOMBAY (W)

Astronomical Date		Instrumental Position at E	Instrumental Position at W	Apparent Difference of Longitude by Observations with E Clock = ΔL − ρ	Apparent Difference of Longitude by Observations with W Clock = ΔL + ρ
1876				m s	m s
January	28	I P E	I P E	16 26 810	16 26 818
"	"	"	"	26 815	26 889
"	29	I P W	I P W	26 872	26 871
"	"	"	"	26 850	26 839
"	30	"	"	26 890	26 948
"	"	"	"	26 887	26 974
February	8	I P E	I P E	26 827	
"	9	"	"	26 780	26 933
"	"	"	"	26 749	26 924
"	10	I P W	I P W	26 820	26 886
"	"	"	"	26 925	26 910
Mean Values by Observations I P E				16 26 796	16 26 891
" I P W				26 874	26 905
General Means				16 26 835	16 26 898

Whence

$$\Delta L = \overset{m}{16}\ \overset{s}{26}\ 867$$

$$\rho = +\ 0\ 032$$

BOLARUM (E), AND BELLARY (W)

Astronomical Date		Instrumental Position at E	Instrumental Position at W	Apparent Difference of Longitude by Observations with E Clock = ΔL − ρ	Apparent Difference of Longitude by Observations with W Clock = ΔL + ρ
1876				m s	m s
February	19	I P W	I P W	6 21 929	6 21 946
"	"	"	"	21 931	21 980
"	20	"	"	21 762	21 817
"	"	"	"	21 757	21 841
"	21	"	"	21 909	21 909
"	"	"	"	21 906	21 881
"	22	I P E	I P E	21 929	21 989
"	"	"	"	21 935	22 016
"	23	"	"	22 051	21 991
"	"	"	"	22 020	22 004
"	24	"	"	22 030	22 032
"	"	"	"	22 040	22 008
Mean Values by Observations I P E				6 22 001	6 22 007
" I P W				21 866	21 896
General Means				6 21 934	6 21 952

Whence

$$\Delta L = \overset{m}{6}\ \overset{s}{21}\ 943$$

$$\rho = +\ 0\ 009$$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

MADRAS (E), AND BOLARUM (W)

Astronomical Date	Instrumental Position at		Apparent Difference of Longitude by Observations with	
	E	W	E Clock = ΔL − ρ	W Clock = ΔL + ρ
1876			m s	m s
March 3	I.P.E	I P E	6 54 594	6 54 559
,, ,,	,,	,,	54 548	54 564
,, 5	,,	,,	54 610	54 608
,, ,,	,,	,,	54 599	54 643
,, 6	,,	,,	54 518	54 603
,, ,	,	,,	54 550	54 583
,, 7	I P W	I P W	54 538	54 656
,, ,,	,,	,	54 562	54 711
,, 8	,,	,,	54 651	54 777
,, ,,	,,	,,	54 703	54 764
,, 12	,,	,,	54 647	54 565
,, ,,	,,	,,	54 605	54 592
Mean Values by Observations *I P E*			6 54 570	6 54 593
,, *I P W*			54 618	54 678
General Means			6 54 594	6 54 636

Whence

$$\Delta L = \overset{m}{6}\ \overset{s}{54}\ 615$$

$$\rho = +\ 0\ 021$$

MADRAS (E), AND BELLARY (W)

Astronomical Date	Instrumental Position at		Apparent Difference of Longitude by Observations with	
	E	W	E Clock = ΔL − ρ	W Clock = ΔL + ρ
1876			m s	m s
March 22	I P W	I P E	13 16 629	13 16 689
, ,,	,,	,,	16 573	16 666
,, 24	,,	,,	16 585	16 658
,, ,,	,,	,,	16 534	16 674
,, 26	,,	I P W	16 620	16 673
,, ,,	,,	,,	16 638	16 662
,, 29	I P E	,,	16 483	
,, ,,	,,	,,	16 461	
,, 30	,,	,,	16 382	16 420
,, ,,	,,	,,	16 347	16 446
,, 31	,,	,,	16 639	16 587
,, ,,	,,	,,	16 612	16 638
April 1	,,	I P.E		16 539
,, ,,	,,	,,		16 535
,, 2	,,	,,	16 569	16 547
, ,,	,,	,,	16 542	16 531
Means			13 16 544	13 16 590

Whence

$$\Delta L = \overset{m}{13}\ \overset{s}{16}\ 567$$

$$\rho = +\ 0\ 023$$

BANGALORE (E), AND BELLARY (W)

Astronomical Date	Instrumental Position at		Apparent Difference of Longitude by Observations with	
	E	W	E Clock = ΔL − ρ	W Clock = ΔL + ρ
1876			m s	m s
April 11	I P E	I P E	2 37 124	2 37 136
,, ,,	,,	,,	37 156	37 167
,, 12	,,	,,	37 129	37 181
,, ,,	,,	,,	37 121	37 170
,, 13	,,	,,	37 131	
,, ,	,,	,,	37 133	37 195
,, 14	I P W	I P W	37 252	37 332
,, ,,	,,	,,	37 204	37 323
,, 17	,,	,,	37 256	37 308
,, ,,	,,	,,	37 296	37 325
,, 18	,,	,,	37 299	37 390
,, ,,	,,	,,	37 356	37 350
Mean Values by Observations *I P E*			2 37 132	2 37 170
,, *I P W*			37 277	37 338
General Means			2 37 205	2 37 254

Whence

$$\Delta L = \overset{m}{2}\ \overset{s}{37}\ 230$$

$$\rho = +\ 0\ 025$$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

VIZAGAPATAM (E), AND MADRAS (W)

Astronomical Date		Instrumental Position at both Stations	Apparent Difference of Longitude by Stars of North Aspect, by Observations with E Clock $= \Delta L_E - \rho$	W Clock $= \Delta L_W + \rho$
1877			m s	m s
January	22	I P E	12 9 742	12 9 882
"	"	"	9 762	9 781
"	23	"	9 773	9 887
"	"	"	9 714	9 840
"	24	"	9 806	9 872
"	"	"	9 795	9 800
"	25	"	9 816	10 024
"	"	"		9 863
"	26	"	9 792	9 821
"	"	"	9 845	9 936
"	27	I P W	10 047	9 982
"	"	"	10 015	
"	29	"	9 978	9 993
"	"	"	9 974	10 025
"	31	"	9 998	10 021
"	"	"	9 939	9 979
February	1	"	9 962	
Mean Values by Observations I P E			12 9 783	12 9 871
" I P W			9 988	10 000
General Means			12 9 886	12 9 936

Whence $\delta L_E =$ 12^m 9^s 911
Correction for Relative Personal Equation, $H_E - C_E =$ − 0 083
$\Delta L_E =$ 12 9 828

Again $\delta L_s =$ 12 9 849
Correction for Relative Personal Equation, $H_s - C_s =$ − 0 019
$\Delta L_s =$ 12 9 830

Finally

$$\Delta L = \tfrac{1}{2}(\Delta L_E + \Delta L_s) = 12^m\ 9^s\ 829$$
$$\rho = +\ 0\ 025$$

VIZAGAPATAM (E), AND BELLARY (W)

Astronomical Date		Instrumental Position at both Stations	Apparent Difference of Longitude by Stars of North Aspect, by Observations with E Clock $= \Delta L_E - \rho$	W Clock $= \Delta L_W + \rho$
1877			m s	m s
February	17	I P W	25 26 507	25 26 614
"	"	"	26 597	26 628
"	21	I P E	26 436	26 565
"	"	"	26 370	
"	22	"	26 428	26 504
"	"	"	26 435	26 519
"	23	I P W	26 508	26 493
"	"	"		26 655
"	24	"	26 393	26 459
"	"	"	26 471	26 491
"	25	I P E	26 551	26 662
"	"	"	26 668	26 726
Mean Values by Observations I P E			25 26 481	25 26 595
" I P W			26 494	26 557
General Means			25 26 488	25 26 576

Whence $\delta L_E =$ 25^m 26^s 532
Correction for Relative Personal Equation, $H_E - C_E =$ − 0 083
$\Delta L_E =$ 25 26 449

Again $\delta L_s =$ 25 26 508
Correction for Relative Personal Equation, $H_s - C_s =$ − 0 019
$\Delta L_s =$ 25 26 489

Finally

$$\Delta L = \tfrac{1}{2}(\Delta L_E + \Delta L_s) = 25^m\ 26^s\ 469$$
$$\rho = +\ 0\ 044$$

MANGALORE (E), AND BOMBAY (W)

Astronomical Date		Instrumental Position at both Stations	Apparent Difference of Longitude by Stars of North Aspect, by Observations with E Clock $= \Delta L_E - \rho$	W Clock $= \Delta L_W + \rho$
1877			m s	m s
March	22	I P E	8 7 269	8 7 298
"	"	"	7 295	7 382
"	24	"	7 236	7 240
"	"	"	7 241	7 262
"	25	"	7 132	7 192
"	"	"	7 161	7 302
"	26	I P W	7 266	7 346
"	"	"	7 322	7 399
Mean Values by Observations I P E			8 7 222	8 7 279
" I P W			7 294	7 373
General Means			8 7 258	8 7 326

Whence $\delta L_E =$ 8^m 7^s 292
Correction for Relative Personal Equation, $H_E - C_E =$ − 0 083
$\Delta L_E =$ 8 7 209

Again $\delta L_s =$ 8 7 272
Correction for Relative Personal Equation, $H_s - C_s =$ − 0 019
$\Delta L_s =$ 8 7 253

Finally

$$\Delta L = \tfrac{1}{2}(\Delta L_E + \Delta L_s) = 8^m\ 7^s\ 231$$
$$\rho = +\ 0\ 034$$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

BOMBAY (E), AND DEESA (W)

Astronomical Date		Instrumental Position at both Stations	Apparent Difference of Longitude by Stars of North Aspect, by Observations with	
			E Clock $= \delta L_N - \rho$	W Clock $= \delta L_N + \rho$
1880			m s	m s
December	13	*I P E*	2 31 529	2 31 710
„	„	„	31 615	31 662
„	14	„	31 622	31 654
„	„	„	31 588	31 648
„	16	„	31 559	31 725
„		„	31 592	31 692
„	17	*I P W*	31 594	31 671
„	„	„	31 662	31 746
„	18	„	31 563	31 628
„	„	„	31 533	31 579
„	19	„	31 553	31 586
„			31 533	
Mean Values by Observations *I P E*			2 31 584	2 31 682
„ *I P W*			31 573	31 642
General Means			2 31 579	2 31 662

Whence $\delta L_N = \overset{m}{2}\ \overset{s}{31}\ 621$

Correction for Relative Personal Equation $C_N - H_N = +\ 0\ 031$

$\Delta L_N = 2\ 31\ 652$

Again $\delta L_S = 2\ 31\ 644$

Correction for Relative Personal Equation, $C_S - H_S = -\ 0\ 009$

$\Delta L_S = 2\ 31\ 635$

Finally

$$\Delta L = \tfrac{1}{2}(\Delta L_N + \Delta L_S) = \overset{m}{2}\ \overset{s}{31}\ 644$$

$$\rho = +\ 0\ 042$$

DEESA (E), AND KURRACHEE (W)

Astronomical Date		Instrumental Position at both Stations	Apparent Difference of Longitude by Stars of North Aspect, by Observations with	
			E Clock $= \delta L_N - \rho$	W Clock $= \delta L_N + \rho$
1881			m s	m s
January	5	*I P W*	20 40 470	20 40 557
„	„	„	40 525	40 603
„	6	„	40 603	40 767
„	„	„	40 622	40 779
„	7	„	40 642	40 756
„	„	„	40 717	40 820
„	8	*I P E*	40 305	40 501
„	„	„	40 415	40 484
„	9	„	40 343	40 470
„	„	„	40 355	40 510
„	10	„	40 427	40 499
„	„	„	40 361	40 591
Mean Values by Observations *I P E*			20 40 368	20 40 509
„ *I P W*			40 597	40 714
General Means			20 40 483	20 40 611

Whence $\delta L_N = \overset{m}{20}\ \overset{s}{40}\ 547$

Correction for Relative Personal Equation, $H_N - C_N = -\ 0\ 031$

$\Delta L_N = 20\ 40\ 516$

Again $\delta L_S = 20\ 40\ 533$

Correction for Relative Personal Equation, $H_S - C_S = +\ 0\ 009$

$\Delta L_S = 20\ 40\ 542$

Finally

$$\Delta L = \tfrac{1}{2}(\Delta L_N + \Delta L_S) = \overset{m}{20}\ \overset{s}{40}\ 529$$

$$\rho = +\ 0\ 064$$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

BOMBAY (E), AND KURRACHEE (W)

Astronomical Date		Instrumental Position at both Stations	Apparent Difference of Longitude by Stars of North Aspect, by Observations with E Clock $= \delta L_N - \rho$	W Clock $= \delta L_N + \rho$
1881			m s	m s
January	17	*I P E*	23 12 077	23 12 208
"	"	"	12 073	12 169
"	18	"	12 079	12 313
"	"	"	12 022	12 277
"	19	"	12 252	12 414
"	"	"	12 214	12 411
"	20	*I P W*	12 137	12 270
"	"	"	12 109	12 339
"	21	"	12 165	12 335
"	"	"	12 105	12 383
"	22	"	12 163	12 464
"	"	"	12 243	12 565
Mean Values by Observations *I P E*			23 12 120	23 12 299
" *I P W*			12 154	12 393
General Means			23 12 137	23 12 346

Whence $\delta L_N = 23^m\ 12^s.241$

Correction for Relative Personal Equation, $H_N - C_N = -\ 0.031$

$\Delta L_N = 23\ 12.210$

Again $\delta L_S = 23\ 12.210$

Correction for Relative Personal Equation $H_S - C_S = +\ 0.009$

$\Delta L_S = 23\ 12.219$

Finally

$$\Delta L = \tfrac{1}{2}(\Delta L_N + \Delta L_S) = 23^m\ 12^s.215$$

$$\rho = +\ 0.105$$

JUBBULPORE (E) AND BOMBAY (W)

Astronomical Date		Instrumental Position at both Stations	Apparent Difference of Longitude by Stars of North Aspect, by Observations with E Clock $= \delta L_N - \rho$	W Clock $= \delta L_N + \rho$
1881			m s	m s
February	6	*I P E*	28 31 792	28 31 951
"	"	"		31 988
"	7	"	31 699	32 011
"	"	"	31 794	31 957
"	8	"	31 759	31 896
"	"	"	31 787	31 970
"	9	"	31 695	31 902
"	"	"	31 726	31 970
"	10	*I P W*	31 834	31 854
"	"		31 787	32 029
"	13	"	31 903	32 013
"		"	31 794	32 001
"	14	"	31 812	31 970
"		"	31 850	32 059
Mean Values by Observations *I P E*			28 31 750	28 31 956
" *I P W*			31 830	31 988
General Means			28 31 790	28 31 972

Whence $\delta L_N = 28^m\ 31^s.881$

Correction for Relative Personal Equation, $H_N - C_N = -\ 0.084$

$\Delta L_N = 28\ 31.797$

Again $\delta L_S = 28\ 31.873$

Correction for Relative Personal Equation, $H_S - C_S = -\ 0.038$

$\Delta L_S = 28\ 31.835$

Finally

$$\Delta L = \tfrac{1}{2}(\Delta L_N + \Delta L_S) = 28^m\ 31^s.816$$

$$\rho = +\ 0.091$$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

JUBBULPORE (E), AND BOLARUM (W)

Astronomical Date		Instrumental Position at both Stations	Apparent Difference of Longitude by Stars of North Aspect, by Observations with E Clock $= \delta L_N - \rho$	Apparent Difference of Longitude by Stars of North Aspect, by Observations with W Clock $= \delta L_N + \rho$
1881			m s	m s
February	23	*I P W*	5 42 881	5 43 064
"	"	"	42 944	43 089
"	24	"	42 909	43 125
"		"	42 907	43 191
"	25	"	42 784	43 078
"	"	"	42 814	43 166
"	28	*I P E*	42 886	43 075
"	"	"	42 894	43 062
March	2	"	42 897	43 102
"	"	"	42 835	43 129
"	3	"	42 905	43 106
"		"	42 907	43 209
Mean Values by Observations *I P E*			5 42 887	5 43 114
" *I P W*			42 833	43 119
General Means			5 42 880	5 43 117

Whence $\delta L_N = 5^m\ 42^s.999$

Correction for Relative Personal Equation $H_N - O_N = -\ 0.084$

$\Delta L_N = 5\ 42.915$

Again $\delta L_S = 5\ 42.992$

Correction for Relative Personal Equation, $H_S - O_S = -\ 0.038$

$\Delta L_S = 5\ 42.954$

Finally

$$\Delta L = \tfrac{1}{2}(\Delta L_N + \Delta L_S) = 5^m\ 42^s.935$$

$$\rho = +\ 0.119$$

JUBBULPORE (E), AND AGRA (W)

Astronomical Date		Instrumental Position at both Stations	Apparent Difference of Longitude by Stars of North Aspect, by Observations with E Clock $= \delta L_N - \rho$	Apparent Difference of Longitude by Stars of North Aspect, by Observations with W Clock $= \delta L_N + \rho$
1881			m s	m s
March	11	*I P E*	7 42 945	7 43 238
"	"	"	43 034	43 119
"	12	"	42 976	43 212
"	"	"	43 057	43 144
"	13	"	43 092	43 285
"	"	"	43 138	43 233
"	15	*I P W*	42 688	42 816
"	"	"	42 712	42 801
"	17	"		42 891
"	"		42 736	42 904
"	20	"	42 684	42 833
	"	"	42 782	42 827
"	21	"	42 854	43 028
		"	42 825	42 972
Mean Values by Observations *I P E*			7 43 040	7 43 189
" *I P W*			42 754	42 884
General Means			7 42 897	7 43 037

Whence $\delta L_N = 7^m\ 42^s.967$

Correction for Relative Personal Equation, $O_N - H_N = +\ 0.084$

$\Delta L_N = 7\ 43.051$

Again $\delta L_S = 7\ 42.962$

Correction for Relative Personal Equation $O_S - H_S = +\ 0.038$

$\Delta L_S = 7\ 43.000$

Finally

$$\Delta L = \tfrac{1}{2}(\Delta L_N + \Delta L_S) = 7^m\ 43^s.026$$

$$\rho = +\ 0.070$$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

JUBBULPORE (E) AND DEESA (W)

Astronomical Date		Instrumental Position at both Stations	Apparent Difference of Longitude by Stars of North Aspect, by Observations with E Clock $= \delta L_N - \rho$	W Clock $= \delta L_N + \rho$
1881			m s	m s
March	28	I P W	31 2 904	31 3 210
"	"	"	3 071	3 317
"	29	"	2 981	3 283
"	"	"	3 166	3 340
"	30	"	3 123	3 273
"	"	"	3 169	3 299
"	31	I P E	3 453	3 566
"	"	"	3 493	3 484
April	1	"	3 383	3 585
"	"	"	3 438	3 505
"	2	"	3 371	3 510
"	"	"	3 394	3 506
Mean Values by Observations		I P E	31 3 422	31 3 526
"		I P W	3 069	3 287
General Means			31 3 246	31 3 407

Whence $\delta L_N = 31^m\ 3^s\ 326$

Correction for Relative Personal Equation, $C_N - H_N = +\ 0\ 084$

$\Delta L_N = 31\ 3\ 410$

Again $\delta L_S = 31\ 3\ 338$

Correction for Relative Personal Equation $C_S - H_S = +\ 0\ 038$

$\Delta L_S = 31\ 3\ 376$

Finally

$$\Delta L = \tfrac{1}{2}\left(\Delta L_N + \Delta L_S\right) = 31^m\ 3^s\ 393$$

$$\rho = +\ 0\ 081$$

AGRA (E), AND DEESA (W)

Astronomical Date		Instrumental Position at both Stations	Apparent Difference of Longitude by Stars of North Aspect, by Observations with E Clock $= \delta L_N - \rho$	W Clock $= \delta L_N + \rho$
1881			m s	m s
April	10	I P E	23 20 226	23 20 367
"	"	"	20 280	20 465
"	11	"	20 381	20 547
"	"	"	20 382	
"	13	"	20 423	20 505
"	"	"	20 380	20 435
"	14	I P W	20 163	20 352
"	"	"	20 258	20 265
"	15	"	20 099	20 264
"	"	"	20 134	20 182
"	16	"	20 107	20 202
"	"	"	20 108	20 115
Mean Values by Observations		I P E	23 20 345	23 20 464
"		I P W	20 145	20 230
General Means			23 20 245	23 20 347

Whence $\delta L_N = 23^m\ 20^s\ 296$

Correction for Relative Personal Equation, $C_N - H_N = +\ 0\ 084$

$\Delta L_N = 23\ 20\ 380$

Again $\delta L_S = 23\ 20\ 321$

Correction for Relative Personal Equation, $C_S - H_S = +\ 0\ 038$

$\Delta L_S = 23\ 20\ 359$

Finally

$$\Delta L = \tfrac{1}{2}\left(\Delta L_N + \Delta L_S\right) = 23^m\ 20^s\ 370$$

$$\rho = +\ 0\ 051$$

Deduction of the Difference of Longitude, ΔL, from Observations of Transits with Local Clocks, combined by Clock Comparisons

BOMBAY (E) AND ADEN (W)

Astronomical Date	Instrumental Position at E	Instrumental Position at W	Epoch by E Clock, T_E	Corrected Difference of Observed Times at Epoch T_E Reduced to Stars of North Aspect M_E	Deduced Clock Difference D at Epoch T_E	Apparent Difference of Longitude, $\delta L_E = D + M_E$
					h m 1 51	h m 1 51
1877			h m s	s	s	s
April 30	*I P E*	*I P E*	14 53 38	− 29 721	49 740	20 019
,			15 21 31	29 843	49 785	19 942
May 1	*I P W*	*I P W*	15 25 12	31 881	51 917	20 036
„ 2	,		14 51 27	33 776	53 917	20 141
,		„	15 20 29	33 909	53 961	20 052
, 3	,		14 55 59	35 967	55 988	20 021
„ ,			15 21 50	35 917	56 027	20 110
4		,	14 54 15	38 131	58 109	19 978
	,	,	15 21 29	38 117	58 147	20 030
, 5	*I P E*	,	14 52 12	40 181	60 195	20 014
, „			15 22 23	40 229	60 244	20 015
„ 7		*I P E*	14 51 59	44 190	64 407	20 217
, ,	„		15 21 54	44 253	64 450	20 197
8	*I P W*		14 53 3	46 309	66 348	20 039
,	,		15 20 15	46 364	66 382	20 018
„ 9	,	,	14 54 40	48 011	68 129	20 118
, ,	,		15 21 32	48 022	68 163	20 141
					Mean	20 064

Mean δL_E = 1h 51m 20s 064; Whence δL_S = 1h 51m 19s 996

Correction for Relative Personal Equation } $H_E - C_E$ = − 0 030 $H_S - C_S$ = + 0 026

Ditto of transcribing = 0 000* = 0 000*

ΔL_E = 1 51 20 034 ΔL_S = 1 51 20 022

Whence

$$\Delta L = \tfrac{1}{2}(\Delta L_E + \Delta L_S) = 1^h\ 51^m\ 20^s\ 028$$

ADEN (E), AND SUEZ (W)

Astronomical Date	Instrumental Position at E	Instrumental Position at W	Epoch by E Clock T_E	Corrected Difference of Observed Times at Epoch T_E Reduced to Stars of North Aspect, M_E	Deduced Clock Difference, D at Epoch T_E	Apparent Difference of Longitude, $\delta L_E = D + M_E$
					h m 0 49	h m 0 49
1877			h m s	s	s	s
May 25	*I P E*	*I P E*	16 42 5	+ 4 473	38 320	42 793
, 26	,		16 46 26	5 374	37 480	42 854
„ 27			16 46 30	6 159	36 822	42 981
„ 28	*I P W*	*I P W*	16 54 48	6 478	36 249	42 727
, 29		,	16 46 32	7 027	35 891	42 918
„ 30		,	16 56 54	7 178	35 687	42 865
					Mean	42 856

Mean δL_E = 0h 49m 42s 856; Whence δL_S = 0h 49m 42s 820

Correction for Relative Personal Equation } $H_E - C_E$ = − 0 030 $H_S - C_S$ = + 0 026

Ditto of transcribing = − 0 011† = − 0 011†

ΔL_E = 0 49 42 815 ΔL_S = 0 49 42 835

Whence

$$\Delta L = \tfrac{1}{2}(\Delta L_E + \Delta L_S) = 0^h\ 49^m\ 42^s\ 825$$

* The records at both stations were transcribed by the same person † Each Observer transcribed his own records of transits

Deduction of the Difference of Longitude, ΔL, from the Determination of Local Clock Corrections, combined by Clock Comparisons

BOMBAY (E), AND ADEN (W)

Astronomical Date	Epoch T_E	E Clock: Instrumental Position	E Clock: Correction as by Stars of North Aspect	E Clock: Time	E Clock: Hourly Rate Correction r_E	W Clock: Instrumental Position	W Clock: Correction as by Stars of North Aspect	W Clock: Time (by E Clock)	W Clock: Hourly Rate Correction r_W	Deduced Clock Corrections at Epoch T_E: for E Clock ΔT_E	Deduced Clock Corrections at Epoch T_E: for W Clock ΔT_W	Difference of Clocks D at Epoch T_E	Apparent Difference of Longitude δL_W = $D + \Delta T_E - \Delta T_W$
1877	h m s		s	h m s	s		s	h m s	s	s	s	h m s	h m s
April 30	16 8 36	*I P E*	−17 655	16 39 23	− 0 033	*I P E*	+12 248	15 37 49	+ 0 064	−17 638	+12 281	1 51 49 861	1 51 19 942
May 1	15 43 43	*I P W*	18 221	16 19 21	030	*I P W*	13 611	15 8 5	060	18 203	13 647	51 944	20 094
„ 2	16 26 39	„	18 872	16 28 33	030	„	15 075	16 24 45	060	18 871	15 077	54 059	20 111
„ 3	15 52 51	„	19 621	16 16 18	030	„	16 375	15 29 23	059	19 609	16 398	56 073	20 066
„ 4	16 1 26	„	20 319	16 23 44	028	„	17 853	15 39 7	056	20 309	1, 874	58 203	20 020
„ 5	16 5 33	*I P E*	21 117	16 28 0	035	„	19 224	15 43 6	064	21 104	19 248	60 315	19 963
„ 7	15 53 40	„	22 434	16 11 35	030	*I P E*	21 885	15 35 45	056	22 425	21 902	64 495	20 168
„ 8	15 46 4	*I P W*	23 167	15 51 23	023	„	23 267	15 40 44	053	23 165	23 272	66 415	19 978
„ 9	15 54 37	„	23 641	16 14 14	022	„	24 439	15 35 0	052	23 634	24 456	68 203	20 113
												Mean	1 51 20 051

Mean δL_W	$=$ 1h 51m 20s 051	Whence δL_E $=$ 1h 51m 19s 983
Correction for Relative Personal Equation, $H_W - C_W$	$=$ − 0 030	$H_E - C_E$ $=$ + 0 026
Ditto transcribing Equation	$=$ 0 000*	$=$ 0 000*
	ΔL_W $=$ 1 51 20 021	ΔL_E $=$ 1 51 20 009

Whence $\Delta L = \frac{1}{2}(\Delta L_W + \Delta L_E)$ = 1h 51m 20s 015

Value deduced in preceding Table = 1 51 20 028

Final value of ΔL, Bombay-Aden, being the mean of the above = 1h 51m 20s 022

* The records at both stations were transcribed by the same person

Deduction of the Difference of Longitude, ΔL, from the Determination of Local Clock Corrections, combined by Clock Comparisons

ADEN (E) AND SUEZ (W)

Astronomical Date	Epoch T_E	E Clock: Instrumental Position	E Clock: Correction as by Stars of North Aspect	E Clock: Time	E Clock: Hourly Rate Correction r_E	W Clock: Instrumental Position	W Clock: Correction as by Stars of North Aspect	W Clock: Time (by E Clock)	W Clock: Hourly Rate Correction r_W	Deduced Clock Corrections at Epoch T_E: for E Clock ΔT_E	Deduced Clock Corrections at Epoch T_E: for W Clock ΔT_W	Difference of Clocks D, at Epoch T_E	Apparent Difference of Longitude δL_E = $D + \Delta T_E - \Delta T_W$
1877	h m s		s	h m s	s		s	h m s	s	s	s	h m s	h m s
May 25	16 41 4	*I P E*	− 4 582	16 42 59	− 0 037	*I P E*	− 8 978	16 39 8	− 0 088	− 4 581	− 8 981	0 49 38 321	0 49 42 721
" "	18 18 45	"	4 635	18 25 20		,	9 173	18 12 9		4 631	9 183	38 238	42 790
" 26	16 40 11	"	5 558	16 41 13	042	,	10 844	16 39 8	082	5 557	10 845	37 484	42 772
" ,	18 18 33	,	5 656	18 21 39		"	11 099	18 15 27		5 654	11 103	37 419	42 868
" 27	16 41 6	"	6 661	16 43 1	031	"	12 705	16 39 10	091	6 660	12 708	36 828	42 876
" ,	18 16 28	,	6 717	18 22 4		,	12 922	18 10 51		6 714	12 931	36 732	42 949
" 28	16 46 0	*I P W*	7 887	16 52 48	039	*I P W*	14 344	16 39 11	086	7 883	14 354	36 256	42 727
" ,	18 9 58	,	7 904	18 15 35		"	14 542	18 4 20		7 900	14 550	36 191	42 841
, 29	16 41 9	,	9 160	16 43 5	055		16 117	16 39 13	080	9 158	16 120	35 893	42 855
" ,	18 16 58	,	9 278	18 21 42		"	16 335	18 12 13		9 274	16 341	35 853	42 920
" 30	16 51 5	"	10 778	16 43 6	065	,	17 874	16 59 3	082	10 787	17 863	35 689	42 765
" "	18 18 52	"	10 887	18 25 28			18 091	18 12 15		10 880	18 100	35 664	42 884
												Mean	0 49 42 831

		h m s			h m s
	Mean δL_E	= 0 49 42 831		Whence δL_S	= 0 49 42 795
Correction for Relative Personal Equation,	$H_E - C_E$	= − 0 030		$H_S - C_S$	= + 0 026
Ditto transcribing Equation		= − 0 011*			= − 0 011*
	ΔL_E	= 0 49 42 790		ΔL_S	= 0 49 42 810

Whence $\Delta L = \frac{1}{2}(\Delta L_E + \Delta L_S) = 0^h\ 49^m\ 42^s\ 800$

Value deduced in preceding Table $= 0^h\ 49^m\ 42^s\ 825$

Final value of ΔL, Aden Suez, being the mean of the above $= 0^h\ 49^m\ 42^s\ 813$

* Each Observer transcribed his own records of transits

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

JALPAIGURI (E), AND FYZABAD (W)

Astronomical Date		Instrumental Position at both Stations	By Clock Comparisons: Epoch by E Clock T_E	Corrected Difference of Observed Times at Epoch T_E Reduced to Stars of North Aspect M_N	Deduced Clock Difference D at Epoch T_E	Apparent Difference of Longitude by Stars of North Aspect $\delta L_N = D + M_N$	By Transits at both Stations with the same Clock — Apparent Difference of Longitude by Stars of North Aspect by Observations with E Clock $= \delta L_N - \rho$	W Clock $= \delta L_N + \rho$
1882			h m s	m s	m s	m s	m s	m s
December	2	*I P E*					26 22 701	26 22 988
"	"	"						23 027
"	4	*I P W*	4 51 29	− 1 52 706	28 15 944	26 23 238	23 095	23 414
"	"		5 11 44	52 720	15 980	23 260	23 141	23 391
"	5	*I P E*	4 51 29	54 862	17 800	22 938	22 783	23 061
"	"		5 11 43	55 006	17 824	22 818	22 42	23 012
	6	*I P W*	4 51 14	56 558	19 688	23 130	22 861	23 167
"	"		5 12 23	56 599	19 ,17	23 118	23 015	23 274
"	7	*I P E*	4 50 26	58 691	21 605	22 914	22 737	23 064
"	"		5 12 22	58 705	21 640	22 935	22 837	23 041
"	8	*I P W*	4 50 14	2 0 454	23 501	23 047	22 861	23 256
"	"		5 12 21	0 486	23 531	23 045	22 938	23 183
"	9	*I P E*	4 50 23	2 669	25 519	22 850	22 781	23 037
"			5 12 19	2 650	25 552	22 902	22 841	23 057
"	11	*I P W*	4 50 20	6 418	29 380	22 962	22 931	23 127
"			5 12 16	6 326	29 416	23 090	23 003	23 129
Mean of daily mean values for instrumental position *I P E* at both stations						26 22 893	26 22 765	26 23 036
" " " " *I P W*						23 111	22 981	23 243
General Means						26 23 002	26 22 873	26 23 140

By Clock Comparisons

Whence $\delta L_N = 26^m\ 23^s.002$

Correction for Relative Personal Equation $\dfrac{3(S_N - C_N) + 4(S_N - H_N)}{7} = -\ 0.009$

$\Delta L_N = 26\ 22.993$

Again $\delta L_S = 26\ 22.950$

Correction for Relative Personal Equation $\dfrac{3(S_S - C_S) + 4(S_S - H_S)}{7} = +\ 0.024$

$\Delta L_S = 26\ 22.974$

Whence $\Delta L = \frac{1}{2}(\Delta L_N + \Delta L_S) = 26^m\ 22^s.984$

$\rho = +\ 0.114$

By Transits at both Stations with the same Clock

$\delta L_N = 26^m\ 23^s.006$

$\dfrac{(S_N - C_N) + (S_N - H_N)}{2} = -\ 0.013$

$\Delta L_N = 26\ 22.993$

$\delta L_S = 26\ 22.958$

$\dfrac{(S_S - C_S) + (S_S - H_S)}{2} = +\ 0.022$

$\Delta L_S = 26\ 22.980$

$\Delta L = 26^m\ 22^s.987$

$\rho = +\ 0.134$

Finally $\Delta L = 26^m\ 22^s.986$

$\rho = +\ 0.124$

NOTE.—Lieut.-Colonel Campbell observed at W on December 2nd, 4th, 5th and 7th Major Heaviside observed at W on December 6th, 8th, 9th and 11th. Major Strahan observed at E throughout.

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

JALPAIGURI (E), AND CALCUTTA (W)

Astronomical Date	Instrumental Position at both Stations	By Clock Comparisons: Epoch by E Clock T_E	By Clock Comparisons: Corrected Difference of Observed Times at Epoch T_E Reduced to Stars of North Aspect M_N	By Clock Comparisons: Deduced Clock Difference D at Epoch T_E	By Clock Comparisons: Apparent Difference of Longitude by Stars of North Aspect $\delta L_N = D + M_N$	By Transits at both Stations with the same Clock — Apparent Difference of Longitude by Stars of North Aspect by Observations with: E Clock $= \delta L_N - \rho$	W Clock $= \delta L_N + \rho$
1882 83		h m s	m s	m s	m s	m s	m s
December 21	I P W	5 18 33	+ 0 27 652	1 2 937	1 30 589	1 30 507	1 30 526
"		33 51	27 639	2 936	30 575	30 512	30 603
" 26	I P E	16 55	29 128	0 822	29 950	29 881	29 943
" "	,	31 21	29 151	0 819	29 970	29 954	30 053
" 27	I P W	17 41	30 399	0 141	30 540	30 559	30 637
" "	,	33 58	30 466	0 132	30 598	30 505	30 597
" 28	I P E	17 38	30 398	0 59 515	29 913	29 904	30 031
, ,	,	34 46	30 405	59 514	29 919	30 010	30 033
, 29	I P W	17 35	31 472	59 025	30 497	30 534	30 638
"	,	33 52	31 465	59 018	30 483	30 490	30 635
January 2	I P E	17 23	33 964	56 041	30 005	29 964	30 021
"		33 40	33 929	56 038	29 967	30 023	30 078
Mean of daily mean values for instrumental position *I P W* at both stations					1 30 547	1 30 518	1 30 606
" " *I P E* "					29 954	29 956	30 027
General Means					1 30 251	1 30 237	1 30 317

By Clock Comparisons:

Whence $\delta L_N = 1^m\ 30^s.251$

Correction for Relative Personal Equation, $S_N - H_N = +\ 0.017$

$\Delta L_N = 1\ 30.268$

Again $\delta L_S = 1\ 30.250$

Correction for Relative Personal Equation, $S_S - H_S = +\ 0.035$

$\Delta L_S = 1\ 30.285$

Whence $\Delta L = \frac{1}{2}(\Delta L_N + \Delta L_S) = 1^m\ 30^s.277$

$\rho = +\ 0.050$

By Transits at both Stations with the same Clock:

$\delta L_N = 1^m\ 30^s.277$

$S_N - H_N = +\ 0.017$

$\Delta L_N = 1\ 30.294$

$\delta L_S = 1\ 30.276$

$S_S - H_S = +\ 0.035$

$\Delta L_S = 1\ 30.311$

$\Delta L = 1^m\ 30^s.303$

$\rho = +\ 0.040$

Finally $\Delta L = 1^m\ 30^s.290$

$\rho = +\ 0.045$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

CHITTAGONG (E), AND JALPAIGURI (W)

Astronomical Date		Instrumental Position at both Stations	By Clock Comparisons: Epoch by E Clock T_E	Corrected Difference of Observed Times at Epoch T_E Reduced to Stars of North Aspect M_N	Deduced Clock Difference D at Epoch T_E	Apparent Difference of Longitude by Stars of North Aspect $\delta L_N = D + M_N$	By Transits at both Stations with the same Clock — Apparent Difference of Longitude by Stars of North Aspect by Observations with: E Clock $= \delta L_N - \rho$	W Clock $= \delta L_N + \rho$
1883			h m s	m s	m s	m s	m s	m s
January	12	*I P E*	7 27 21	− 0 36 610	13 1 738	12 25 128	12 24 977	12 25 135
"	"	"	51 59	36 748	1 769	25 021	24 971	25 130
"	13	*I P W*	27 20	39 613	4 260	24 647	24 520	24 680
"	"	"	51 12	39 691	4 309	24 618	24 514	24 840
"	14	*I P E*	27 6	41 872	6 927	25 055	24 957	25 093
"	"	"	51 11	41 935	6 962	25 027	24 964	25 198
"	15	*I P W*	27 5	44 795	9 489	24 694	24 486	24 842
"	"	"	51 9	44 868	9 530	24 662	24 513	24 767
"	17	*I P E*	27 1	49 417	14 429	25 012	24 909	25 154
"	"	"	52 8	49 297	14 467	25 170	24 892	25 192
"	18	*I P W*	26 59	52 126	16 786	24 660	24 533	24 772
"	"	"	51 4	52 270	16 831	24 561	24 492	24 831
Mean of daily mean values for instrumental position *I P E* at both stations						12 25 069	12 24 945	12 25 150
" *I P W* "						24 640	24 510	24 789
General Means						12 24 835	12 24 728	12 24 970

By Clock Comparisons:

Whence $\delta L_N = 12^m\ 24^s\ 845$

Correction for Relative Personal Equation, $H_N - S_N = -\ 0\ 017$

$\Delta L_N = 12\ 24\ 838$

Again $\delta L_S = 12\ 24\ 835$

Correction for Relative Personal Equation, $H_S - S_S = -\ 0\ 035$

$\Delta L_S = 12\ 24\ 800$

Whence $\Delta L = \frac{1}{2}(\Delta L_N + \Delta L_S) = 12^m\ 24^s\ 819$

$\rho = +\ 0\ 104$

By Transits at both Stations:

$\delta L_N = 12^m\ 24^s\ 849$

$H_N - S_N = -\ 0\ 017$

$\Delta L_N = 12\ 24\ 832$

$\delta L_S = 12\ 24\ 829$

$H_S - S_S = -\ 0\ 035$

$\Delta L_S = 12\ 24\ 794$

$\Delta L = 12^m\ 24^s\ 813$

$\rho = +\ 0\ 121$

Finally $\Delta L = 12^m\ 24^s\ 816$

$\rho = +\ 0\ 113$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

CHITTAGONG (E), AND CALCUTTA (W)

Astronomical Date		Instrumental Position at both Stations	By Clock Comparisons: Epoch by E Clock T_E	By Clock Comparisons: Corrected Difference of Observed Times at Epoch T_E Reduced to Stars of North Aspect M_N	By Clock Comparisons: Deduced Clock Difference D at Epoch T_E	By Clock Comparisons: Apparent Difference of Longitude by Stars of North Aspect $\delta L_N = D + M_N$	By Transits at both Stations with the same Clock — Apparent Difference of Longitude by Stars of North Aspect by Observations with E Clock $= \delta L_N - \rho$	W Clock $= \delta L_N + \rho$
1883			h m s	m s	m s	m s	m s	m s
January	23	*I P W*	8 0 26	− 0 4 734	13 59 698	13 54 964	13 55 036	13 55 001
"		"	17 34	4 724	59 670	54 946	54 919	54 971
"	24	*I P E*	2 10	0 881	56 271	55 390	55 263	55 403
"	"	"	19 4	0 847	56 228	55 381	55 323	55 434
"	25	*I P W*	2 5	+ 2 273	52 650	54 923	54 915	55 040
"	"	"	19 24	2 330	52 615	54 945	54 883	55 014
"	26	*I P E*	2 5	6 094	49 125	55 219	55 227	55 325
"	"	"	19 37	6 202	49 089	55 291	55 349	55 376
"	28	*I P W*	1 58	12 430	42 642	55 072	55 035	55 161
"	"	"	19 32	12 463	42 606	55 069	55 071	55 144
"	29	*I P E*	1 55	15 320	40 026	55 346	55 221	55 378
"	"	"	19 30	15 315	39 993	55 308	55 241	55 365
"	30	*I P W*	1 52	17 661	37 421	55 082	55 057	55 178
"	"	"	19 27	17 748	37 386	55 134	55 003	55 150
Mean of daily mean values for instrumental position *I P W* at both stations						13 55 017	13 54 990	13 55 083
" " " *I P E* "						55 323	55 271	55 382
					General Means	13 55 170	13 55 131	13 55 233

By Clock Comparisons

Whence $\delta L_N = 13^m\ 55^s.170$

Correction for Relative Personal Equation, $H_N - S_N = -\ 0.017$

$\Delta L_N = 13\ 55.153$

Again $\delta L_S = 13\ 55.160$

Correction for Relative Personal Equation, $H_S - S_S = -\ 0.035$

$\Delta L_S = 13\ 55.125$

Whence $\Delta L = \frac{1}{2}(\Delta L_N + \Delta L_S) = 13^m\ 55^s.139$

$\rho = +\ 0.071$

By Transits at both Stations with the same Clock

$\delta L_N = 13^m\ 55^s.182$

$H_N - S_N = -\ 0.017$

$\Delta L_N = 13\ 55.165$

$\delta L_S = 13\ 55.172$

$H_S - S_S = -\ 0.035$

$\Delta L_S = 13\ 55.137$

$\Delta L = 13^m\ 55^s.151$

$\rho = +\ 0.051$

Finally $\Delta L = 13^m\ 55^s.145$

$\rho = +\ 0.061$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

CALCUTTA (E), AND FYZABAD (W)

Astronomical Date	Instrumental Position at both Stations	By Clock Comparisons: Epoch by E Clock T_E	Corrected Difference of Observed Times at Epoch T_E Reduced to Stars of North Aspect M_N	Deduced Clock Difference D at Epoch T_E	Apparent Difference of Longitude by Stars of North Aspect $\delta L_N = D + M_N$	By Transits at both Stations with the same Clock: Apparent Difference of Longitude by Stars of North Aspect by Observations with E Clock $= \delta L_N - \rho$	W Clock $= \delta L_N + \rho$
1883		h m s	m s	m s	m s	m s	m s
February 8	*I P E*	9 41 32	+ 0 50 710	24 2 096	24 52 806	24 52 832	24 52 851
" "	"	10 1 38	50 812	2 021	52 833	52 743	52 888
" 9	*I P W*	9 38 55	55 632	23 56 919	52 551	52 520	
" ,	,					52 543	
" 10	*I P E*	9 37 18	1 0 811	51 992	52 803	52 722	52 881
" "	,	10 1 11	0 892	51 913	52 805	52 775	52 799
" 11	*I P W*	9 41 30	5 104	47 448	52 552	52 501	52 678
" "	"	10 1 36	5 154	47 381	52 535	52 457	52 674
" 13	*I P E*	9 41 29	12 741	40 018	52 759	52 771	52 858
" "	,	10 1 35	12 855	39 967	52 822	52 724	52 808
" 14	*I P W*	9 41 28	16 182	36 391	52 513	52 478	52 586
"	,	10 1 35	16 192	36 342	52 534	52 532	52 661
Mean of daily mean values for instrumental position *I P E* at both stations					24 52 805	24 52 761	24 52 848
, *I P W* "					52 549	52 505	52 610
General Means					24 52 677	24 52 633	24 52 749

By Clock Comparisons:

Whence $\delta L_N = 24^m\ 52^s.677$

Correction for Relative Personal Equation, $H_N - S_N = -\ 0.017$

$\Delta L_N = 24\ 52.660$

Again $\delta L_S = 24\ 52.682$

Correction for Relative Personal Equation, $H_S - S_S = -\ 0.035$

$\Delta L_S = 24\ 52.647$

By Transits at both Stations with the same Clock:

$\delta L_N = 24^m\ 52^s.691$

$H_N - S_N = -\ 0.017$

$\Delta L_N = 24\ 52.674$

$\delta L_S = 24\ 52.696$

$H_S - S_S = -\ 0.035$

$\Delta L_S = 24\ 52.661$

Whence $\Delta L = \frac{1}{2}(\Delta L_N + \Delta L_S) = 24^m\ 52^s.654$

$\rho = +\ 0.075$

$\Delta L = 24^m\ 52^s.668$

$\rho = +\ 0.058$

Finally $\Delta L = 24^m\ 52^s.661$

$\rho = +\ 0.067$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ

CALCUTTA (E), AND JUBBULPORE (W)

Astronomical Date		Instrumental Position at both Stations	By Clock Comparisons: Epoch by E Clock T_E	By Clock Comparisons: Corrected Difference of Observed Times at Epoch T_E Reduced to Stars of North Aspect M_N	By Clock Comparisons: Deduced Clock Difference D at Epoch T_E	By Clock Comparisons: Apparent Difference of Longitude by Stars of North Aspect $\delta L_N = D + M_N$	By Transits at both Stations with the same Clock: Apparent Difference of Longitude by Stars of North Aspect by Observations with E Clock $= \delta L_N - \rho$	By Transits at both Stations with the same Clock: W Clock $= \delta L_N + \rho$
1888			h m s	m s	m s	m s	m s	m s
February	22	*I P W*	10 0 17	− 0 7 574	33 45 095	33 37 521	33 37 547	33 37 670
"	"	"	16 18	7 509	45 135	37 626	37 512	37 728
"	23	*I P E*	0 16	10 492	48 282	37 790	37 702	37 816
"	"	'	16 17	10 489	48 319	37 830	37 742	37 900
"	24	*I P W*	0 15	13 647	51 285	37 638	37 584	37 759
"	"	"	17 49	13 793	51 328	37 535	37 524	37 562
"	28	*I P E*	0 9	29 155	34 7 025	37 870	37 741	37 969
"	"		16 10	29 219	7 064	37 848	37 720	37 974
March	2	*I P W*	0 7	35 750	13 295	37 545	37 571	37 615
"	"		16 8	35 639	13 326	37 687	37 501	37 692
"	3	*I P E*						37 890
"	"	"	18 13	38 617	16 492	37 875	37 856	38 052
Mean of daily mean values for instrumental position *I P W* at both stations						33 37 592	33 37 540	33 37 671
" " *I P E* "						37 848	37 770	37 934
General Means						33 37 720	33 37 655	33 37 803

By Clock Comparisons:

Whence $\delta L_N = 33^m\ 37^s\ 720$

Correction for Relative Personal Equation, $H_N - S_N = -\ 0\ 017$

$\Delta L_N = 33\ 37\ 703$

Again $\delta L_S = 33\ 37\ 725$

Correction for Relative Personal Equation, $H_S - S_S = -\ 0\ 035$

$\Delta L_S = 33\ 37\ 690$

By Transits at both Stations with the same Clock:

$\delta L_N = 33^m\ 37^s\ 729$

$H_N - S_N = -\ 0\ 017$

$\Delta L_N = 33\ 37\ 712$

$\delta L_S = 33\ 37\ 734$

$H_S - S_S = -\ 0\ 035$

$\Delta L_S = 33\ 37\ 699$

Whence $\Delta L = \frac{1}{2}(\Delta L_N + \Delta L_S) = 33^m\ 37^s\ 697$

$\rho = +\ 0\ 091$

$\Delta L = 33^m\ 37^s\ 706$

$\rho = +\ 0\ 074$

Finally $\Delta L = 33^m\ 37^s\ 702$

$\rho = +\ 0\ 083$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

FYZABAD (E), AND JUBBULPORE (W)

Astronomical Date	Instrumental Position at both Stations	By Clock Comparisons: Epoch by E Clock T_E	By Clock Comparisons: Corrected Difference of Observed Times at Epoch T_E Reduced to Stars of North Aspect M_N	By Clock Comparisons: Deduced Clock Difference D at Epoch T_E	By Clock Comparisons: Apparent Difference of Longitude by Stars of North Aspect $\delta L_N = D + M_N$	By Transits at both Stations with the same Clock: Apparent Difference of Longitude by Stars of North Aspect by Observations with E Clock $= \delta L_N - \rho$	By Transits at both Stations with the same Clock: Apparent Difference of Longitude by Stars of North Aspect by Observations with W Clock $= \delta L_N + \rho$
1888		h m s	m s	m s	m s	m s	m s
March 14	*I P E*	10 48 27	− 0 23 921	9 9 172	8 45 251	8 45 237	8 45 260
" "	"	11 14 58	24 073	9 320	45 247	45 176	45 244
" 15	*I P W*	10 50 39	31 919	16 846	44 927	44 836	44 963
" "	"	11 13 4	32 047	16 958	44 911	44 911	44 986
" 16	*I P E*	10 50 44	39 208	24 352	45 144	45 101	45 248
" "	"	11 13 9	39 275	24 464	45 189	45 107	45 223
" 17	*I P W*	10 50 50	47 065	32 075	45 010	44 918	44 980
" "	"	11 10 40	47 237	32 172	44 935	44 823	44 993
" 18	*I P E*	10 50 55	54 563	39 780	45 217	45 187	45 332
" "	"	11 12 21	54 641	39 890	45 249	45 201	45 247
" 19	*I P W*	10 51 1	1 2 354	47 252	44 898	44 785	44 953
" "	"	11 12 27	2 494	47 362	44 868	44 870	44 997
" 20	*I P E*	10 51 6	9 578	54 757	45 179	45 146	45 257
" "	"	11 13 31	9 623	54 871	45 248	45 138	45 260
Mean of daily mean values for instrumental position *I P E* at both stations					8 45 216	8 45 162	8 45 258
" " *I P W* "					44 925	44 857	44 979
General Means					8 45 071	8 45 010	8 45 119

By Clock Comparisons:

Whence $\delta L_N = 8^m\ 45^s.071$

Correction for Relative Personal Equation, $H_N - S_N = -\ 0.017$

$\Delta L_N = 8\ 45.054$

Again $\delta L_S = 8\ 45.068$

Correction for Relative Personal Equation, $H_S - S_S = -\ 0.035$

$\Delta L_S = 8\ 45.033$

Whence $\Delta L = \frac{1}{2}(\Delta L_N + \Delta L_S) = 8^m\ 45^s.043$

$\rho = +\ 0.048$

By Transits at both Stations with the same Clock:

$\delta L_N = 8^m\ 45^s.064$

$H_N - S_N = -\ 0.017$

$\Delta L_N = 8\ 45.047$

$\delta L_S = 8\ 45.061$

$H_S - S_S = -\ 0.035$

$\Delta L_S = 8\ 45.026$

$\Delta L = 8^m\ 45^s.037$

$\rho = +\ 0.055$

Finally $\Delta L = 8^m\ 45^s.040$

$\rho = +\ 0.052$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

FYZABAD (E), AND AGRA (W)

Astronomical Date	Instrumental Position at both Stations	By Clock Comparisons: Epoch by E Clock T_E	By Clock Comparisons: Corrected Difference of Observed Times at Epoch T_E Reduced to Stars of North Aspect M_N	By Clock Comparisons: Deduced Clock Difference D at Epoch T_E	By Clock Comparisons: Apparent Difference of Longitude by Stars of North Aspect $\delta L_N = D + M_N$	By Transits at both Stations with the same Clock: Apparent Difference of Longitude by Stars of North Aspect by Observations with E Clock $= \delta L_N - \rho$	By Transits at both Stations with the same Clock: Apparent Difference of Longitude by Stars of North Aspect by Observations with W Clock $= \delta L_N + \rho$
1883		h m s	m s	m s	m s	m s	m s
March 28	*I P E*	11 58 32	+ 0 20 591	16 7 479	16 28 070	16 27 988	16 28 116
" "	"	12 17 23	20 645	7 467	28 112	27 959	28 131
" 29	*I P W*	11 59 58	21 260	6 714	27 974	27 925	
" "	"	12 18 24	21 214	6 692	27 906	27 883	27 972
" 30	*I P E*	11 58 10	22 328	5 740	28 068	28 033	28 202
" "	"	12 17 56	22 399	5 738	28 137	28 028	28 202
" 31	*I P W*	11 57 0	22 731	5 174	27 905	27 769	27 937
" "	"	12 17 39	22 729	5 159	27 878	27 780	27 963
April 3	*I P E*	11 58 56	25 639	2 483	28 122	28 031	28 134
" "	"	12 17 55	25 747	2 453	28 200	28 083	28 273
" 4	*I P W*	11 59 5	26 601	1 325	27 926	27 825	27 900
" "	"	12 18 1	26 573	1 301	27 874	27 796	27 923
Mean of daily mean values for instrumental position *I P E* at both stations					16 28 118	16 28 020	16 28 176
" " *I P W* "					27 910	27 830	27 948
General Means					16 28 014	16 27 925	16 28 061

By Clock Comparisons:

Whence $\delta L_N = 16^m\ 28^s.014$

Correction for Relative Personal Equation, $H_N - S_N = +\ 0.007$

$\Delta L_N = 16\ 28.021$

Again $\delta L_S = 16\ 28.046$

Correction for Relative Personal Equation, $H_S - S_S = -\ 0.058$

$\Delta L_S = 16\ 27.988$

Whence $\Delta L = \frac{1}{2}(\Delta L_N + \Delta L_S) = 16^m\ 28^s.005$

$\rho = +\ 0.038$

By Transits at both Stations with the same Clock:

$\delta L_N = 16^m\ 27^s.993$

$H_N - S_N = +\ 0.007$

$\Delta L_N = 16\ 28.000$

$\delta L_S = 16\ 28.025$

$H_S - S_S = -\ 0.058$

$\Delta L_S = 16\ 27.967$

$\Delta L = 16^m\ 27^s.984$

$\rho = +\ 0.068$

Finally $\Delta L = 16^m\ 27^s.995$

$\rho = +\ 0.053$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

AKYAB (E), AND CALCUTTA (W)

Astronomical Date	Instrumental Position at — E	Instrumental Position at — W	By Clock Comparisons — Epoch by E Clock T_E	Corrected Difference of Observed Times at Epoch T_E Reduced to Stars of North Aspect M_N	Deduced Clock Difference D at Epoch T_E	Apparent Difference of Longitude by Stars of North Aspect $\delta L_N = D + M_N$	By Transits at both Stations with the same Clock — Apparent Difference of Longitude by Stars of North Aspect by Observations with E Clock $= \delta L_N - \rho$	W Clock $= \delta L_N + \rho$
1883			h m s	m s	m s	m s	m s	m s
November 27	*I P E*	*I P E*	4 23 15	+ 0 11 036	17 58 767	18 9 803	18 9 639	18 9 799
" "	"	"	41 41	11 079	58 767	9 846	9 652	9 829
December 8	*I P W*	"	5 15 51	17 662	51 738	9 400	9 366	9 426
" "	"	"	29 31	17 758	51 726	9 484	9 351	9 463
" 9	"	*I P W*	15 51	18 356	50 877	9 233	9 055	9 187
" "	"	"	29 31	18 308	50 866	9 174	9 182	9 218
" 10	*I P E*	"	15 52	18 868	50 354	9 222	9 188	9 397
" "	"	"	29 31	18 944	50 349	9 293	9 142	9 300
" 11	"	*I P E*	15 52	19 151	50 392	9 543	9 438	9 716
" "	"	"	29 32	19 218	50 392	9 610	9 513	9 710
" 12	*I P W*	"	15 52	18 648	50 784	9 432	9 458	9 556
" "	"	"	29 32	18 821	50 789	9 610	9 520	9 619
" 13	"	*I P W*	15 53	18 037	51 251	9 288	9 118	9 328
" "	"	"	29 32	18 038	51 250	9 288	9 266	9 328
" 14	*I P E*	"	15 53	17 777	51 488	9 265	9 200	9 392
" "	"	"	29 32	17 923	51 488	9 411	9 295	9 333
Mean of daily mean values for instrumental position *I P E* at both stations						18 9 701	18 9 561	18 9 764
" " *I P W* at E Station and *I P E* at W Station						9 482	9 424	9 516
" " *I P W* at both stations						9 246	9 155	9 265
" " *I P E* at E Station and *I P W* at W Station						9 298	9 206	9 356
General Means						18 9 432	18 9 337	18 9 475

By Clock Comparisons:

Whence $\delta L_N = 18^m\ 9^s.432$

Correction for Relative Personal Equation, $H_N - S_N = +\ 0.008$

$\Delta L_N = 18\ 9.440$

Again $\delta L_S = 18\ 9.404$

Correction for Relative Personal Equation, $H_S - S_S = -\ 0.029$

$\Delta L_S = 18\ 9.375$

Whence $\Delta L = \frac{1}{2}(\Delta L_N + \Delta L_S) = 18^m\ 9^s.407$

$\rho = +\ 0.056$

By Transits at both Stations with the same Clock:

$\delta L_N = 18^m\ 9^s.406$

$H_N - S_N = +\ 0.008$

$\Delta L_N = 18\ 9.414$

$\delta L_S = 18\ 9.378$

$H_S - S_S = -\ 0.029$

$\Delta L_S = 18\ 9.349$

$\Delta L = 18^m\ 9^s.382$

$\rho = +\ 0.069$

Finally $\Delta L = 18^m\ 9^s.395$

$\rho = +\ 0.063$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

AKYAB (E), AND CHITTAGONG (W)

Astronomical Date		Instrumental Position at E	Instrumental Position at W	By Clock Comparisons: Epoch by E Clock T_E	By Clock Comparisons: Corrected Difference of Observed Times at Epoch T_E Reduced to Stars of North Aspect M_N	By Clock Comparisons: Deduced Clock Difference D at Epoch T_E	By Clock Comparisons: Apparent Difference of Longitude by Stars of North Aspect $\delta L_N = D + M_N$	By Transits at both Stations with the same Clock: Apparent Difference of Longitude by Stars of North Aspect by Observations with E Clock $= \delta L_N - \rho$	By Transits at both Stations with the same Clock: Apparent Difference of Longitude by Stars of North Aspect by Observations with W Clock $= \delta L_N + \rho$
1883 84				h m s	m s	m s	m s	m s	m s
December	26	*I P E*	*I P E*	5 51 16	+ 0 16 488	3 58 026	4 14 514	4 14 461	4 14 534
"	,		"	6 6 32	16 608	57 914	14 522	14 403	14 528
"	27	*I P W*	"	5 51 15	25 808	48 586	14 394	14 297	14 375
"	,	"	"	6 6 32	25 872	48 484	14 356	14 331	14 375
"	28	"	*I P W*	5 51 14	35 208	38 916	14 124	14 081	14 107
"	,		"	6 7 39	35 321	38 793	14 114	14 046	14 113
"	29	*I P E*	"	5 51 13	44 927	29 182	14 109	13 986	14 095
"	"	"	"	6 6 30	45 032	29 072	14 104	14 040	14 163
"	30	"	*I P E*	5 51 13	54 797	19 531	14 328	14 353	14 384
"	,	"	"	6 5 21	54 955	19 435	14 390	14 328	14 374
January	2	*I P W*	"	5 51 11	1 25 046	2 49 300	14 346	14 311	14 384
"		"		6 6 28	25 156	49 188	14 344	14 348	14 382
"	3	"	*I P W*	5 51 10	34 657	39 295	13 952	13 940	14 046
"	"		,	6 6 27	34 834	39 187	14 021	13 993	14 029
"	4	*I P E*	"	5 51 9	44 732	29 443	14 175	14 095	14 194
"	,		,	6 6 26	44 791	29 326	14 117	14 141	14 196
Mean of daily mean values for instrumental position *I P E* at both stations							4 14 439	4 14 386	4 14 455
" " *I P W* at E Station and *I P E* at W Station							14 360	14 322	14 379
" " *I P W* at both stations							14 053	14 015	14 074
" " *I P E* at E Station and *I P W* at W Station							14 126	14 066	14 162
General Means							4 14 245	4 14 197	4 14 268

By Clock Comparisons:

Whence $\delta L_N = 4^m\ 14^s.245$

Correction for Relative Personal Equation, $H_N - S_N = +\ 0.008$

$\Delta L_N = 4\ 14.253$

Again $\delta L_S = 4\ 14.293$

Correction for Relative Personal Equation, $H_S - S_S = -\ 0.029$

$\Delta L_S = 4\ 14.264$

By Transits at both Stations with the same Clock:

$\delta L_N = 4^m\ 14^s.232$

$H_N - S_N = +\ 0.008$

$\Delta L_N = 4\ 14.240$

$\delta L_S = 4\ 14.280$

$H_S - S_S = -\ 0.029$

$\Delta L_S = 4\ 14.251$

$$\text{Whence}\quad \Delta L = \tfrac{1}{2}(\Delta L_N + \Delta L_S) = 4^m\ 14^s.258 \qquad \rho = +\ 0.036$$

$$\Delta L = 4^m\ 14^s.246 \qquad \rho = +\ 0.036$$

$$\text{Finally}\quad \Delta L = 4^m\ 14^s.252 \qquad \rho = +\ 0.036$$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

PROME (E), AND CHITTAGONG (W)

Astronomical Date		Instrumental Position at E	Instrumental Position at W	Apparent Difference of Longitude by Stars of North Aspect by Observations with E Clock $= \delta L_N - \rho$	Apparent Difference of Longitude by Stars of North Aspect by Observations with W Clock $= \delta L_N + \rho$
1884				m s	m s
January	21	*I P W*	*I P W*	13 30 343 30 364	13 30 417 30 511
"	"	*I P E*	"	30 231 30 329	30 269 30 261
"	22	"	*I P E*	30 465 30 503	30 516 30 564
"	"	*I P W*	"	30 546 30 519	30 611 30 696
"	23	"	*I P W*	30 293 30 298	30 345 30 405
"	"	*I P E*	"	30 376 30 376	30 485 30 443
"	24	"	*I P E*	30 673 30 648	30 776 30 758
"	"	*I P W*	"	30 510 30 426	30 526 30 573
"	25	"	*I P W*	30 217 30 226	30 343 30 391
"	"	*I P E*	"	30 306 30 324	30 518 30 478
"	26	"	*I P E*	30 584 30 556	30 735 30 710
"	"	*I P W*	"	30 490 30 392	30 552 30 488
"	29	"	*I P W*	30 255 30 243	30 368 30 341
"	"	*I P E*	"	30 459 30 408	30 483 30 461
"	30	"	*I P E*	30 611 30 541	30 676 30 700
"	"	*I P W*	"	30 512 30 426	30 586 30 555
Mean of daily mean values for instrumental position	*I P E* at both stations			13 30 573	13 30 679
	I P W at E Station and *I P E* at W Station			30 478	30 573
	I P W at both stations			30 280	30 391
	I P E at E Station and *I P W* at W Station			30 351	30 425
	General Means			13 30 421	13 30 517

		m s
Whence	$\delta L_N =$	13 30 469
Correction for Relative Personal Equation, $H_N - S_N$	$=$	+ 0 008
	$\Delta L_N =$	13 30 477
Again	$\delta L_S =$	13 30 495
Correction for Relative Personal Equation, $H_S - S_S$	$=$	− 0 029
	$\Delta L_S =$	13 30 466

$$\text{Finally } \Delta L = \tfrac{1}{2}(\Delta L_N + \Delta L_S) = 13^{m}\ 30^{s}.472$$
$$\rho = + 0.048$$

PROME (E), AND AKYAB (W)

Astronomical Date		Instrumental Position at E	Instrumental Position at W	Apparent Difference of Longitude by Stars of North Aspect by Observations with E Clock $= \delta L_N - \rho$	Apparent Difference of Longitude by Stars of North Aspect by Observations with W Clock $= \delta L_N + \rho$
1884				m s	m s
February	8	*I P E*	*I P E*	9 16 326	9 16 347
"	"	"	"	16 330	16 439
"	"	*I P W*	"	16 268	16 411
"	"	"	"	16 356	16 413
"	9	"	*I P W*	16 017	16 107
"	"	"	"	15 960	16 049
"	"	*I P E*	"	16 129	16 263
"	"	"	"	16 109	16 205
"	12	"	*I P E*	16 405	16 491
"	"	"	"	16 361	16 415
"	"	*I P W*	"	16 236	16 389
"	"	"	"	16 185	16 334
"	13	"	*I P W*	16 122	16 207
"	"	"	"	16 089	16 095
"	"	*I P E*	"	16 252	16 281
"	"	"	"	16 209	16 251
Mean of daily mean values for instrumental position	*I P E* at both stations			9 16 356	9 16 423
	I P W at E Station and *I P E* at W Station			16 261	16 387
	I P W at both stations			16 047	16 115
	I P E at E Station and *I P W* at W Station			16 175	16 250
	General Means			9 16 210	9 16 294

		m s
Whence	$\delta L_N =$	9 16 252
Correction for Relative Personal Equation, $H_N - S_N$	$=$	+ 0 008
	$\Delta L_N =$	9 16 260
Again	$\delta L_S =$	9 16 292
Correction for Relative Personal Equation, $H_S - S_S$	$=$	− 0 029
	$\Delta L_S =$	9 16 263

$$\text{Finally } \Delta L = \tfrac{1}{2}(\Delta L_N + \Delta L_S) = 9^{m}\ 16^{s}.262$$
$$\rho = + 0.042$$

Deduction of the Apparent Difference of Longitude, ΔL, and the Retardation of Signals, ρ.

MOULMEIN (E), AND PROME (W)

Astronomical Date	Instrumental Position at E	Instrumental Position at W	Apparent Difference of Longitude by Stars of North Aspect by Observations with E Clock $= \delta L_N - \rho$	Apparent Difference of Longitude by Stars of North Aspect by Observations with W Clock $= \delta L_N + \rho$
1884			m s	m s
March 8	*I P E*	*I P W*	9 38 639 38 697	9 38 780 38 798
„ 9	*I P W*	„	38 844 38 855	38 858 38 835
„ 10		*I P E*	38 721 38 722	38 800 38 825
„ „	*I P E*	„	38 711 38 734	38 762 38 701
11	„	*I P W*	38 685 38 721	38 760 38 776
„	*I P W*	„	38 746 38 792	38 826 38 842
„ 12	„	*I P E*	38 774 38 747	38 746 38 814
„	*I P E*	„	38 624 38 648	38 672 38 643
„ 13	„	*I P W*	38 700 38 690	38 760 38 738
„ „	*I P W*	„	38 738 38 751	38 744 38 770
14	„	*I P E*	38 745 38 758	38 829 38 745
„ „	*I P E*		38 689 38 638	38 681 38 645
„ 15	„	*I P W*	38 68[illegible] 38 660	38 747 38 760
„	*I P W*		38 797 38 [illegible]88	38 9[illegible]9 38 852
Mean of daily mean values for instrumental position: *I P E* at both stations			9 38 674	9 38 684
I P W at E Station and *I P E* at W Station			38 745	38 793
I P W at both stations			38 789	38 834
I P E at E Station and *I P W* at W Station			38 685	38 765
General Means			9 38 723	9 38 769

Whence $\delta L_N =$ 9m 38s·746

Correction for Relative Personal Equation, $S_N - H_N =$ − 0·008

$\Delta L_N =$ 9 38·738

Again $\delta L_S =$ 9 38·749

Correction for Relative Personal Equation $S_S - H_S =$ + 0·029

$\Delta L_S =$ 9 38·778

Finally $\Delta L = \frac{1}{2}(\Delta L_N + \Delta L_S) =$ 9m 38s·758

$\rho =$ + 0·023

MOULMEIN (E), AND AKYAB (W)

Astronomical Date	Instrumental Position at E	Instrumental Position at W	Apparent Difference of Longitude by Stars of North Aspect by Observations with E Clock $= \delta L_N - \rho$	Apparent Difference of Longitude by Stars of North Aspect by Observations with W Clock $= \delta L_N + \rho$
1884			m s	m s
March 26	*I P E*	*I P E*	18 54 810 54 837	18 54 992 54 962
„ 27	*I P W*	*I P W*	55 045 55 033	55 153 55 128
„ „	*I P E*	„	54 9[illegible]2 54 970	55 033 55 014
„ 28	„	*I P E*		54 924 54 961
„ „	*I P W*	„	54 945 54 972	55 039 55 036
„ 29	„	*I P W*	55 063 55 082	55 168 55 128
„ „	*I P E*	„	54 948 54 930	55 011 55 068
„ 30	„	*I P E*	54 937 54 866	54 927 54 918
„ „	*I P W*	„	54 957 54 986	55 021 54 959
31	„	*I P W*	55 037 55 045	55 075 55 083
„	*I P E*	„	54 887 54 954	54 949 55 111
April 1		*I P E*	54 930 54 883	54 946 55 008
„ „	*I P W*	„	54 819 54 888	54 970 54 953
Mean of daily mean values for instrumental position: *I P E* at both stations			18 54 877	18 54 955
I P W at E Station and *I P E* at W Station			54 928	54 996
I P W at both stations			55 051	55 122
I P E at E Station and *I P W* at W Station			54 944	55 031
General Means			18 54 950	18 55 026

Whence $\delta L_N =$ 18m 54s·988

Correction for Relative Personal Equation, $S_N - H_N =$ − 0·008

$\Delta L_N =$ 18 54·980

Again $\delta L_S =$ 18 54·938

Correction for Relative Personal Equation $S_S - H_S =$ + 0·029

$\Delta L_S =$ 18 54·967

Finally $\Delta L = \frac{1}{2}(\Delta L_N + \Delta L_S) =$ 18m 54s·974

$\rho =$ + 0·038

ELECTRO-TELEGRAPHIC LONGITUDES

PART IV.

SIMULTANEOUS REDUCTION

AND

FINAL RESULTS OF THE WHOLE OF THE OPERATIONS,

ALSO

A SHORT DISCUSSION ON LOCAL ATTRACTION.

CHAPTER I

THE FINAL REDUCTION OF THE ARCS OF LONGITUDE

The arcs of longitude, contained in this, and in the preceding Volumes IX and X, extend in a network over the greater part of India from Peshawar in the north to Cape Comorin in the south, and from Quetta in the west to Moulmein in the east, as will be seen from the chart in Plate V In consequence of the measures of these arcs being fallible, the difference of longitude of any two stations connected in different ways by two or more arcs, will vary according to the arcs selected for the connection Hence it is necessary to undertake the simultaneous reduction of them all into one harmonious whole, and the particulars of this reduction are given in detail in the present volume By the expression "one harmonious whole" is meant that whatever selection of arcs is taken as a route to join any two stations, the resulting difference of longitude of those two stations is always the same

The operation is a far simpler one than the corresponding reduction in the case of the triangulation and base lines, partly because the number of quantities to be dealt with is very much less, but chiefly because the conditions to be fulfilled are fewer and simpler there is in fact only one condition, and that is, that the so called "circuit-error" of every triangle formed by three arcs of longitude should be equal to zero, for it is obvious that if this condition hold for every triangle in a network, it will also hold for every polygon formed in any way whatever of such triangles Hence it follows that, in a simple network of triangles built up one upon another without any crossing or superfluous rays, the number of equations to be solved will be equal to the number of triangles In the network reduced in this volume there is only one case of a superfluous ray, and that is in the quadrilateral Agra–Deesa–Kurrachee–Mooltan, where both diagonals have been measured, the whole problem resolves itself into the solution of thirty-one equations containing fifty-five unknown quantities, which equations are to be solved in such a manner that the sum of the squares of the corrections to the arcs is made a minimum

In every triangle formed by three arcs of longitude, if the work is perfectly performed, one of the arcs must equal the sum of the other two, the difference from equality is called throughout the description of longitude work in India the "circuit error" of the triangle Of the three stations forming the angular points of such a triangle, one must necessarily be to the east, one to the west, and the third

lying somewhere between these two, (excluding the possible though extremely unlikely case of more than one of the stations being on the same meridian) In the schedule of equations given in *Table III* the two arcs containing the middle station are written with the positive sign, and the third arc, *i.e.*, the one joining the extreme stations, is written with the negative sign, and hence the algebraic sum of the three gives the numerical value of the circuit-error as the right-hand member of the equation.

It will be noticed that this system of reduction takes no account of the weight of each arc, and it will be advisable to show here, why it was believed that the rejection of weights, or, more correctly speaking, the assumption of equal weights for all the arcs, was justifiable Briefly stated the reason was that the only data available for computing the probable error of an arc (on the reciprocal of which the weight depends) produced probable errors so small in comparison with those that were shown actually to exist by the circuit equations, that it was clear that some cause of inaccuracy was present, which prevented the formulæ employed for determining the probable error from representing even approximately its true value The usual system of computing the probable error of a quantity that has been determined by a number of independent measures, is by a discussion in some form or other of the residuals, or in other words by a comparison of each individual value with the mean of certain groups or sets in which it occurs but in the case of these arcs of longitude the following difficulty arises The assumption of a mean C_0 for observations in both pivot positions, as explained in Part III, results in the same final mean whatever the actual assumed value of C_0 may be, *i.e.*, whether C_0 be taken at 0, 10, 20 or any other magnitude, the finally concluded value of the arc will, so far at least as it depends on collimation correction, remain the same the effect of an error in the adopted value of C_0 is that the measures in the different pivot positions will be more or less divergent, thus giving rise to a large probable error if computed from the residuals by the usual method, though the final mean will be unaffected Hence it follows that the discrepancies which appear between observations *I P E* and *I P W*, so far as they are caused by an erroneous C_0, should not be allowed to have any effect in decreasing the weight of an arc Practically it is not possible to ascertain to what extent discrepancies of this sort are due to this cause, or how far to other causes which might reasonably be supposed to justify a decrease of weight, and consequently any attempt to base the weight of an arc upon considerations of this kind seems impracticable For although a weight form might perhaps be designed to take account of these discrepancies on a system analogous to that by which the angles of the triangulation are weighted, the difference of each observation on any night from the mean of that night corresponding to the errors of one zero, and the differences between successive nights corresponding to the errors of zero means, yet it appeared so doubtful whether any weight thus deduced would give any true idea of the relative accuracy of the arcs, that the idea was abandoned, and all the arcs have been assumed to possess the same weight

These longitude observations furnish another instance of the well-known fact that if groups of measures of a certain quantity are made at different times, but under exactly the same apparent conditions, and with the same instrument, such groups will differ by quantities which appear surprisingly large, and impossible to be accounted for The results obtained from night to night, under the same conditions as far as pivot position, clock, relays, stars, observers, &c., are concerned, show considerable discrepancies, much larger in fact than can be attributed to want of skill or care in the observers Changes of pivots may naturally be expected to produce, and do produce, marked fluctuations in the measures, more marked indeed than those alluded to above, yet these latter are by no means insignificant.

An attempt was made to obtain a *relative* weight for each arc without any regard to its computed probable error in the following way For each arc the following data were prepared, (1) the difference between its greatest and least value, or the *range* over which all the measures were distributed, and (2) the number of stars on which the arc depended The value of ρ, the electrical retardation, for each arc was added to all the observations *I P E* and subtracted from all those *I P W* before the range was

taken out. It was found that these two quantities varied between comparatively narrow limits for nearly all the arcs observed; and hence it follows that if the errors are distributed according to the law of the probability curve,—and there is no *à priori* improbability in such a supposition—that the relative weights of all the arcs will also vary between narrow limits The first of the two above mentioned quantities approximates pretty closely to 0ˢ 5, and the second to 180 An obvious objection to this proceeding is that the *range*, though not the accuracy of the final value of an arc, is affected by an error in the adopted value of C_0 as explained above

An empirical formula for the relative weight was deduced from these data by dividing the number of stars observed by one hundred times the range, this however produced weights, as might be expected, varying so little from equality, and so closely proportional to the number of stars observed, that it was considered an unnecessary addition to the labour of reduction to apply them It is satisfactory to observe that the close agreement of these two quantities in all the arcs that were examined, affords a strong justification for the assumption finally made in the reduction, *viz*, the equal weight of all the arcs that enter into it.

Personal equation might reasonably be supposed to have a considerable effect on the final concluded value of an arc, being liable to fluctuations which are often obscure, and incapable of being controlled moreover error in this equation enters into the result with its full value, and does not admit of cancelment, except partially by interchange of observers The weight of an arc might reasonably be made to depend on the uncertainty, or variability, of this equation, but here a difficulty comes in Personal equation is generally measured three times at least, and often more, during a season's work now if its value varies from time to time, the only practical assumption is that it varies uniformly, and it has been the custom to compute its value on this supposition, so that the only available system of applying weights based on personal equation would be to give an arbitrarily low value to those arcs during which the equation was varying quickly and *vice versâ*, but it could not be expected that such a system would command any confidence, nor would it justify the extra labour which it would entail in solving the equations of condition

If an attempt be made to obtain a probable error from the consideration of residuals, as furnished by the observations on each single night, or from groups of observations during which no change of pivot is made, it will be found that a probable error thus deduced will be absurdly small in comparison with the circuit-errors The influence of erroneous estimation of the moment when a star crosses a wire is extremely minute, for in the case of a single wire the probable error of the estimation amounts to only 0ˢ 04, and for the eleven wires over which a star is usually taken, to only about 0ˢ 01, and as from one hundred and eighty to two hundred stars are generally observed on each arc by each observer, it seems obvious that errors resulting from this cause must be utterly insignificant.

There is yet another source of error remaining, which seems at first sight as if it might be made a basis for assigning relative weights to the arcs, *i e*, the value of ρ, which is the electrical retardation, or, to speak more exactly, half the difference between ΔL as determined by the E and by the W clock, respectively Now the velocity with which an electric signal is transmitted along a wire is by no means accurately known, there is, however, an empirical formula in use by the Prussian Geodesists as follows:—

$$t = 000{,}0129\, m + 000{,}000{,}008\, m^2$$

where t is the time of transmission in seconds of time and m is the length of the wire in miles, but it is not known what reliance can be placed on its correctness Now in most cases there is no difficulty in ascertaining within small limits the length of the wire connecting two stations, and it has been found in every case that ρ exceeds the value of t as calculated from the above formula, this excess can only be attributed to armature-time in the various relays used on the commutator-board It is by no means certain whether all or any of this armature-time is cancelled in the mean of the observations

with the two clocks, and any outstanding portion of it must always become a positive source of error in the resulting value of the arc Still the accurate following out of the effects of armature-time through all the apparatus, *vide* page (21), Appendix, Volume X, leaves so much doubt on this point, and so much open to mere supposition, that at the most a mere arbitrary weight could be assigned being some simple function of the difference between the theoretical and the actual ρ and although it seems probable that an abnormal value of ρ may very reasonably be supposed to indicate an untrustworthy arc, no satisfactory system of assigning a weight based on such a consideration has been devised A brief discussion on the value of retardation as deduced from the whole of the Indian longitude operations will be found in Appendix No 2 of this Volume

A doubt was suggested at one time whether errors in the places of the circumpolar stars used in the determination of the deviation of the transit instruments from the meridian, would have any appreciable effect It is obvious that if the two instruments are on the same parallel of latitude, and the same circumpolar stars used at both stations, no effect can ensue, but in some cases the stations differ largely in latitude, and an investigation was made which completely banished all suspicion that any bad effect could be thus produced In the case of the arc Bombay-Kurrachee (two stations having the greatest difference of latitude of any pair yet observed) it was found that an error of one second of time in the Right Ascension of δ Ursæ Minoris or 51 Cephei (which were taken as typical circumpolar stars) would only produce a difference of deviation in the two instruments of $\frac{1}{80}$ of a micrometer division, a quantity entirely rejectaneous in the correction of transits of longitude stars for azimuthal deviation

These considerations, taken in conjunction with the fact that the circumstances under which each arc was measured, were made as similar as possible, as far as the number of stars observed, the pivot changes, the arrangement of the electrical apparatus, &c, were concerned, seem to justify the assumption of adopting an equal weight for all, and this has accordingly been done in the simultaneous reduction

The numerical reduction can for the most part be presented in tabular form

In *Table No I* is given a list of the fifty-five arcs, which enter into the reduction, with their observed numerical values For convenience of computation a distinguishing number (in brackets) is allotted to each *Table II* contains the thirty one circuits formed by these fifty five arcs with their numerical errors Each circuit is expressed symbolically by the numbers of the arcs forming it, and is also distinguished by a Roman numeral

The correction to each arc being symbolized by the letter x with a subscript corresponding to the number of the arc to which it appertains, thirty-one equations are formed in which the left-hand member contains corrections corresponding to the several arcs in the equations of *Table II*, and the right-hand members are the same as those in that table, but with the signs changed throughout These equations are exhibited in *Table III*, and have now to be solved subject to the two following conditions, (1) that each equation shall be exactly satisfied, and (2) that the sum of the squares of x_1, x_2, x_3, &c. shall be a minimum To effect this the following well-known process is employed —Each equation is differentiated, and the first is multiplied by an indeterminate factor f_1, the second by f_2, the third by f_3, and so on The equations thus formed are added together, forming a resulting equation in which the coefficients of dx_1, dx_2, dx_3, &c, consist of the indeterminate factors f_1, f_2, f_3, &c, connected by addition and subtraction only If the equation $x_1^2 + x_2^2 + x_3^2 +$ &c, = minimum be also differentiated, and the coefficients of dx_1, dx_2, dx_3, &c, in the result be equated to those of dx_1, dx_2, dx_3, in the former equation, a set of values of x_1, x_2, x_3, &c, is obtained in terms of the indeterminate factors. *Table IV* gives a synopsis of the values of x_1, x_2, x_3, &c, thus expressed.

These values being then substituted in the set of equations in *Table III* produce thirty-one equations between thirty-one unknown quantities f_1, f_2, f_3, &c, which are exhibited in *Table V*.

This group is solved in the manner usually employed for simultaneous equations, and the values of the indeterminate factors f_1, f_2, f_3, thus obtained are given in *Table VI*, and these being substituted in *Table IV* furnish the values of x_1, x_2, x_3, &c., given in *Table VII*, which will be found to fulfil the two necessary conditions.

Table VIII is inserted to prove the accuracy of the numerical work by actual substitution of the computed values of f and x in the original equations, and lastly in *Table IX* are shown the corrected values of the several arcs as well as the geodetic values, and a comparison between the two is given in the last column.

It will be noticed that the corrections are satisfactorily small, out of the fifty-five there are

19	between	$0^s.000$	and	$0^s.010$	including	the	latter	value
17	"	0 010	"	0 020	"	"	"	"
10	"	0 020	"	0 030	"	"	"	"
6	"	0 030	"	0 040	"	"	"	"
3	"	0 040	"	0 045	"	"	"	"

As the longitude from Greenwich of Kalianpur, the origin of the Indian Survey is still liable to further small corrections, it has not been thought necessary to give any table of absolute longitudes of Indian stations, they can however be obtained very approximately, if required, by taking the longitude of Kalianpur in *Table IX* at $77^\circ\ 39'\ 21''.83$ or $5^h\ 10^m\ 37^s.455$ E of Greenwich, and making the necessary additions or subtractions

Table I.—List of Arcs with their distinguishing Numbers and observed Values.

Name of Arc	No	Observed Value	Name of Arc	No.	Observed Value
		m s			m s
Mooltan–Quetta	(1)	17 43 499	Bellary–Bombay	(29)	16 26 867
Kurrachee–Quetta	(2)	0 1 603	Bangalore–Bellary	(30)	2 37 230
Mooltan–Kurrachee	(3)	17 41 976	Bellary–Mangalore	(31)	8 19 653
Agra–Deesa	(4)	23 20 370	Mangalore–Bombay	(32)	8 7 273
Deesa–Kurrachee	(5)	20 40 529	Bangalore–Nagarkoil	(33)	0 35 708
Deesa–Mooltan	(6)	2 58 582	Nagarkoil–Mangalore	(34)	10 21 141
Agra–Kurrachee	(7)	44 0 992	Madras–Nagarkoil	(35)	11 15 006
Agra–Mooltan	(8)	26 19 053	Madras–Bangalore	(36)	10 39 331
Amritsar–Mooltan	(9)	13 44 281	Madras–Mangalore	(37)	21 36 129
Peshawar–Mooltan	(10)	0 27 483	Madras–Bellary	(38)	13 16 567
Amritsar–Peshawar	(11)	13 16 776	Madras–Bolarum	(39)	6 54 615
Agra–Amritsar	(12)	12 34 725	Waltair–Madras	(40)	12 16 868
Dehra Dun–Agra	(13)	0 7 233	Waltair–Bolarum	(41)	19 11 525
Dehra Dun–Amritsar	(14)	12 41 995	Waltair–Jubbulpore	(42)	13 28 501
Fyzabad–Agra	(15)	16 27 995	Calcutta–Waltair	(43)	20 9 194
Fyzabad–Dehra Dun	(16)	16 20 704	Calcutta–Jubbulpore	(44)	33 37 702
Fyzabad–Jubbulpore	(17)	8 45 040	Calcutta–Fyzabad	(45)	24 52 661
Jubbulpore–Agra	(18)	7 43 026	Jalpaiguri–Calcutta	(46)	1 30 290
Jubbulpore–Deesa	(19)	31 3 393	Jalpaiguri–Fyzabad	(47)	26 22 986
Jubbulpore–Bombay	(20)	28 31 816	Chittagong–Calcutta	(48)	13 55 145
Jubbulpore–Kalianpur	(21)	9 10 323	Chittagong–Jalpaiguri	(49)	12 24 816
Agra–Kalianpur	(22)	1 27 319	Akyab–Chittagong	(50)	4 14 252
Kalianpur–Bombay	(23)	19 21 441	Akyab–Calcutta	(51)	18 9 395
Bombay–Kurrachee	(24)	23 12 215	Prome–Akyab	(52)	9 16 262
Bombay–Deesa	(25)	2 31 644	Prome–Chittagong	(53)	13 30 472
Jubbulpore–Bolarum	(26)	5 42 935	Moulmein–Prome	(54)	9 38 758
Bolarum–Bombay	(27)	22 48 785	Moulmein–Akyab	(55)	18 54 974
Bolarum–Bellary	(28)	6 21 943			

Table II—Circuit Errors

I	(2)	+	(3)	−	(1)	=	+0	080
II	(4)	+	(5)	−	(7)	=	−	093
III	(4)	+	(6)	−	(8)	=	−	101
IV	(6)	+	(3)	−	(5)	=	+	029
V	(12)	+	(9)	−	(8)	=	−	047
VI	(11)	+	(10)	−	(9)	=	−	022
VII	(13)	+	(12)	−	(14)	=	−	037
VIII	(16)	+	(13)	−	(15)	=	−	058
IX	(17)	+	(18)	−	(15)	=	+	071
X	(18)	+	(22)	−	(21)	=	+	022
XI	(18)	+	(4)	−	(19)	=	+	003
XII	(21)	+	(23)	−	(20)	=	−	052
XIII	(20)	+	(25)	−	(19)	=	+	067
XIV	(25)	+	(5)	−	(24)	=	−	042
XV	(26)	+	(27)	−	(20)	=	−	096
XVI	(28)	+	(29)	−	(27)	=	+	025
XVII	(31)	+	(32)	−	(29)	=	+	059
XVIII	(35)	+	(34)	−	(37)	=	+	018
XIX	(38)	+	(31)	−	(37)	=	+	091
XX	(36)	+	(30)	−	(38)	=	−	006
XXI	(36)	+	(33)	−	(35)	=	+	033
XXII	(39)	+	(28)	−	(38)	=	−	009
XXIII	(40)	+	(39)	−	(41)	=	−	042
XXIV	(42)	+	(26)	−	(41)	=	−	089
XXV	(43)	+	(42)	−	(44)	=	−	007
XXVI	(45)	+	(17)	−	(44)	=	−	001
XXVII	(46)	+	(45)	−	(47)	=	−	035
XXVIII	(49)	+	(46)	−	(48)	=	−	039
XXIX	(52)	+	(50)	−	(53)	=	+	042
XXX	(54)	+	(52)	−	(55)	=	+	046
XXXI	(50)	+	(48)	−	(51)	=	+	002

Table III—Synopsis of Equations of Condition for Solution.

I	$x_2 + x_3 - x_1 =$	−0 080
II	$x_4 + x_5 - x_7 =$	+ 093
III	$x_4 + x_6 - x_8 =$	+ 101
IV	$x_6 + x_3 - x_5 =$	− 029
V	$x_{12} + x_9 - x_8 =$	+ 047
VI	$x_{11} + x_{10} - x_9 =$	+ 022
VII	$x_{13} + x_{12} - x_{14} =$	+ 037
VIII	$x_{16} + x_{13} - x_{15} =$	+ 058
IX	$x_{17} + x_{18} - x_{15} =$	− 071
X	$x_{18} + x_{22} - x_{21} =$	− 022
XI	$x_{18} + x_4 - x_{19} =$	− 003
XII	$x_{21} + x_{23} - x_{20} =$	+ 052
XIII	$x_{20} + x_{25} - x_{19} =$	− 067
XIV	$x_{25} + x_5 - x_{24} =$	+ 042
XV	$x_{26} + x_{27} - x_{20} =$	+ 096
XVI	$x_{28} + x_{29} - x_{27} =$	− 025
XVII	$x_{31} + x_{32} - x_{29} =$	− 059
XVIII	$x_{35} + x_{34} - x_{37} =$	− 018
XIX	$x_{38} + x_{31} - x_{37} =$	− 091
XX	$x_{36} + x_{30} - x_{38} =$	+ 006
XXI	$x_{36} + x_{33} - x_{35} =$	− 033
XXII	$x_{39} + x_{28} - x_{38} =$	+ 009
XXIII	$x_{40} + x_{39} - x_{41} =$	+ 042
XXIV	$x_{42} + x_{26} - x_{41} =$	+ 089
XXV	$x_{43} + x_{42} - x_{44} =$	+ 007
XXVI	$x_{45} + x_{17} - x_{44} =$	+ 001
XXVII	$x_{46} + x_{45} - x_{47} =$	+ 035
XXVIII	$x_{49} + x_{46} - x_{48} =$	+ 039
XXIX	$x_{52} + x_{50} - x_{53} =$	− 042
XXX	$x_{54} + x_{52} - x_{55} =$	− 046
XXXI	$x_{50} + x_{48} - x_{51} =$	− 002

Table IV.—Tabular Statement showing the Values of the

Arc Correction	f_1	f_2	f_3	f_4	f_5	f_6	f_7	f_8	f_9	f_{10}	f_{11}	f_{12}	f_{13}	f_{14}	f_{15}	f_{16}
x_1	− 1															
x_2	+ 1															
x_3	+ 1			+ 1												
x_4		+ 1	+ 1								+ 1					
x_5		+ 1		− 1										+ 1		
x_6			+ 1	+ 1												
x_7		− 1														
x_8			− 1		− 1											
x_9					+ 1	− 1										
x_{10}						+ 1										
x_{11}						+ 1										
x_{12}					+ 1		+ 1									
x_{13}							+ 1	+ 1								
x_{14}							− 1									
x_{15}								− 1	− 1							
x_{16}								+ 1								
x_{17}									+ 1							
x_{18}									+ 1	+ 1	+ 1					
x_{19}											− 1		− 1			
x_{20}												− 1	+ 1		− 1	
x_{21}										− 1		+ 1				
x_{22}										+ 1						
x_{23}												+ 1				
x_{24}														− 1		
x_{25}													+ 1	+ 1		
x_{26}															+ 1	
x_{27}															+ 1	− 1
x_{28}																+ 1
x_{29}																+ 1
x_{30}																
x_{31}																
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x_{51}																
x_{52}																
x_{53}																
x_{54}																
x_{55}																

Arc-Corrections in Terms of the Indeterminate Factors

f_{17}	f_{18}	f_{19}	f_{20}	f_{21}	f_{22}	f_{23}	f_{24}	f_{25}	f_{26}	f_{27}	f_{28}	f_{29}	f_{30}	f_{31}	Arc Correction
															x_1
															x_2
															x_3
															x_4
															x_5
															x_6
															x_7
															x_8
															x_9
															x_{10}
															x_{11}
															x_{12}
															x_{13}
															x_{14}
															x_{15}
															x_{16}
									+ 1						x_{17}
															x_{18}
															x_{19}
															x_{20}
															x_{21}
															x_{22}
															x_{23}
															x_{24}
															x_{25}
							+ 1								x_{26}
															x_{27}
					+ 1										x_{28}
− 1															x_{29}
			+ 1												x_{30}
+ 1		+ 1													x_{31}
+ 1															x_{32}
				+ 1											x_{33}
	+ 1														x_{34}
	+ 1			− 1											x_{35}
			+ 1	+ 1											x_{36}
	− 1	− 1													x_{37}
		+ 1	− 1		− 1										x_{38}
					+ 1	+ 1									x_{39}
						+ 1									x_{40}
						− 1	− 1								x_{41}
							+ 1	+ 1							x_{42}
								+ 1							x_{43}
								− 1	− 1						x_{44}
									+ 1	+ 1					x_{45}
										+ 1	+ 1				x_{46}
										− 1					x_{47}
											− 1			+ 1	x_{48}
											+ 1				x_{49}
												+ 1		+ 1	x_{50}
														− 1	x_{51}
												+ 1	+ 1		x_{52}
												− 1			x_{53}
													+ 1		x_{54}
													− 1		x_{55}

Table V.—Showing the Equations

No of Equation of Condition	f_1	f_2	f_3	f_4	f_5	f_6	f_7	f_8	f_9	f_{10}	f_{11}	f_{12}	f_{13}	f_{14}	f_{15}	f_{16}
I	+ 3			+ 1												
II		+ 3	+ 1	− 1							+ 1			+ 1		
III		+ 1	+ 3	+ 1	+ 1						+ 1					
IV	+ 1	− 1	+ 1	+ 3										− 1		
V			+ 1		+ 3	− 1	+ 1									
VI					− 1	+ 3										
VII					+ 1		+ 3	+ 1								
VIII							+ 1	+ 3	+ 1							
IX								+ 1	+ 3	+ 1	+ 1					
X									+ 1	+ 3	+ 1	− 1				
XI		+ 1	+ 1						+ 1	+ 1	+ 3		+ 1			
XII										− 1		+ 3	− 1		+ 1	
XIII											+ 1	− 1	+ 3	+ 1	− 1	
XIV		+ 1		− 1									+ 1	+ 3		
XV												+ 1	− 1		+ 3	− 1
XVI															− 1	+ 3
XVII																− 1
XVIII																
XIX																
XX																
XXI																
XXII																+ 1
XXIII																
XXIV															+ 1	
XXV																
XXVI									+ 1							
XXVII																
XXVIII																
XXIX																
XXX																
XXXI																

between the Indeterminate Factors

f_{17}	f_{18}	f_{19}	f_{20}	f_{21}	f_{22}	f_{23}	f_{24}	f_{25}	f_{26}	f_{27}	f_{28}	f_{29}	f_{30}	f_{31}	Numerical Values	No of Equation of Condition
															− ·080	I
															+ ·093	II
															+ ·101	III
															− ·029	IV
															+ ·047	V
															+ ·022	VI
															+ ·037	VII
															+ ·058	VIII
									+ 1						− ·071	IX
															− ·022	X
															− ·003	XI
															+ ·052	XII
															− ·067	XIII
															+ ·042	XIV
							+ 1								+ ·096	XV
− 1					+ 1										− ·025	XVI
+ 3		+ 1													− ·059	XVII
	+ 3	+ 1		− 1											− ·018	XVIII
+ 1	+ 1	+ 3	− 1		− 1										− ·091	XIX
		− 1	+ 3	+ 1	+ 1										+ ·006	XX
	− 1		+ 1	+ 3											− ·033	XXI
		− 1	+ 1		+ 3	+ 1									+ ·009	XXII
					+ 1	+ 3	+ 1								+ ·042	XXIII
						+ 1	+ 3	+ 1							+ ·089	XXIV
							+ 1	+ 3	+ 1						+ ·007	XXV
								+ 1	+ 3	+ 1					+ ·001	XXVI
									+ 1	+ 3	+ 1				+ ·035	XXVII
										+ 1	+ 3			− 1	+ ·039	XXVIII
												+ 3	+ 1	+ 1	− ·042	XXIX
												+ 1	+ 3		− ·046	XXX
											− 1	+ 1		+ 3	− ·002	XXXI

Table VI—The Values of the Indeterminate Factors.

$f_1 = -$ 028967	$f_9 = -$ 050454	$f_{17} = -$ 013390	$f_{25} = -$ 015634
$f_2 = +$ 017940	$f_{10} = +$ 009137	$f_{18} = -$ 000007	$f_{26} = +$ 022861
$f_3 = +$ 016506	$f_{11} = +$ 010273	$f_{19} = -$ 028102	$f_{27} = -$ 001496
$f_4 = +$ 006902	$f_{12} = +$ 009229	$f_{20} = -$ 002638	$f_{28} = +$ 016626
$f_5 = +$ 016367	$f_{13} = -$ 026948	$f_{21} = -$ 010124	$f_{29} = -$ 013518
$f_6 = +$ 012789	$f_{14} = +$ 019304	$f_{22} = -$ 004066	$f_{30} = -$ 010827
$f_7 = -$ 005819	$f_{15} = +$ 006503	$f_{23} = +$ 005009	$f_{31} = +$ 009381
$f_8 = +$ 038091	$f_{16} = -$ 009274	$f_{24} = +$ 031041	

Table VII—The Values of the Arc-Corrections

Arc-Correction	Value to five places of decimals	Adopted Value to three places of decimals	Arc Correction	Value to five places of decimals	Adopted Value to three places of decimals	Arc Correction	Value to five places of decimals	Adopted Value to three places of decimals
	s	s		s	s		s	s
x_1	+ 02897	+ 029	x_{20}	− 04268	− 043	x_{39}	+ 00094	000
x_2	− 02897	− 029	x_{21}	+ 00009	000	x_{40}	+ 00501	+ 006
x_3	− 02207	− 022	x_{22}	+ 00914	+ 009	x_{41}	− 03605	− 036
x_4	+ 04472	+ 045	x_{23}	+ 00923	+ 009	x_{42}	+ 01541	+ 016
x_5	+ 03034	+ 030	x_{24}	− 01930	− 019	x_{43}	− 01563	− 016
x_6	+ 02341	+ 023	x_{25}	− 00764	− 007	x_{44}	− 00723	− 007
x_7	− 01794	− 018	x_{26}	+ 03754	+ 037	x_{45}	+ 02137	+ 022
x_8	− 03287	− 033	x_{27}	+ 01578	+ 016	x_{46}	+ 01513	+ 015
x_9	+ 00358	+ 004	x_{28}	− 01334	− 013	x_{47}	+ 00150	+ 002
x_{10}	+ 01279	+ 013	x_{29}	+ 00412	+ 004	x_{48}	− 00725	− 007
x_{11}	+ 01279	+ 013	x_{30}	− 00264	− 003	x_{49}	+ 01663	+ 017
x_{12}	+ 01055	+ 010	x_{31}	− 04149	− 041	x_{50}	− 00414	− 004
x_{13}	+ 03227	+ 032	x_{32}	− 01339	− 014	x_{51}	− 00938	− 009
x_{14}	+ 00582	+ 005	x_{33}	− 01012	− 010	x_{52}	− 02435	− 024
x_{15}	+ 01236	+ 012	x_{34}	− 00001	000	x_{53}	+ 01352	+ 014
x_{16}	+ 03809	+ 038	x_{35}	+ 01012	+ 010	x_{54}	− 01083	− 011
x_{17}	− 02759	− 028	x_{36}	− 01276	− 013	x_{55}	+ 01083	+ 011
x_{18}	− 03104	− 031	x_{37}	+ 02811	+ 028			
x_{19}	+ 01668	+ 017	x_{38}	− 02140	− ·022			

Table VIII—The Numerical Checks through the Absolute Terms

No. of Equation of Condition	Equations of Condition between		Value as given in Equation of Condition	By Substitution of		
	Arc Corrections	Indeterminate Factors		Indeterminate Factors	Arc Corrections	
					As computed to five decimals	As contracted to three decimals
I	$x_3 + x_2 - x_1$	$+3f_1 + f_4$	− ·080	− ·079999	− ·08001	− ·080
II	$x_4 + x_5 - x_7$	$+3f_2 + f_3 - f_4 + f_{11} + f_{14}$	+ ·093	+ ·093001	+ ·09300	+ ·093
III	$x_4 + x_6 - x_8$	$+f_2 + 3f_3 + f_4 + f_5 + f_{11}$	+ ·101	+ ·101000	+ ·10100	+ ·101
IV	$x_6 + x_3 - x_5$	$+f_1 - f_2 + f_3 + 3f_4 - f_{14}$	− ·029	− ·028999	− ·02900	− ·029
V	$x_{12} + x_9 - x_8$	$+f_3 + 3f_5 - f_6 + f_7$	+ ·047	+ ·046999	+ ·04700	+ ·047
VI	$x_{11} + x_{10} - x_9$	$-f_5 + 3f_6$	+ ·022	+ ·022000	+ ·02200	+ ·022
VII	$x_{13} + x_{12} - x_{14}$	$+f_6 + 3f_7 + f_8$	+ ·037	+ ·037001	+ ·03700	+ ·037
VIII	$x_{16} + x_{13} - x_{15}$	$+f_7 + 3f_8 + f_9$	+ ·058	+ ·058000	+ ·05800	+ ·058
IX	$x_{17} + x_{18} - x_{15}$	$+f_8 + 3f_9 + f_{10} + f_{11} + f_{26}$	− ·071	− ·071000	− ·07099	− ·071
X	$x_{18} + x_{22} - x_{21}$	$+f_9 + 3f_{10} + f_{11} - f_{12}$	− ·022	− ·021999	− ·02199	− [illegible]
XI	$x_{18} + x_4 - x_{19}$	$+f_2 + f_3 + f_9 + f_{10} + 3f_{11} + f_{13}$	− ·003	− ·003000	− ·00300	− ·003
XII	$x_{21} + x_{23} - x_{20}$	$-f_{10} + 3f_{12} - f_{13} + f_{15}$	+ ·052	+ ·052001	+ ·05200	+ ·052
XIII	$x_{20} + x_{25} - x_{19}$	$+f_{11} - f_{12} + 3f_{13} + f_{14} - f_{15}$	− ·067	− ·066999	− ·06700	− ·067
XIV	$x_{25} + x_6 - x_{24}$	$+f_2 - f_4 + f_{13} + 3f_{14}$	+ ·042	+ ·042002	+ ·04200	+ ·042
XV	$x_{26} + x_{27} - x_{20}$	$+f_{12} - f_{13} + 3f_{15} - f_{16} + f_{24}$	+ ·096	+ ·096001	+ ·09600	+ ·096
XVI	$x_{28} + x_{29} - x_{27}$	$-f_{15} + 3f_{16} - f_{17} + f_{22}$	− ·025	− ·025001	− ·02500	− ·025
XVII	$x_{31} + x_{32} - x_{29}$	$-f_{16} + 3f_{17} + f_{19}$	− ·059	− ·058998	− ·05900	− ·059
XVIII	$x_{35} + x_{34} - x_{37}$	$+3f_{18} + f_{19} - f_{21}$	− ·018	− ·017999	− ·01800	− ·018
XIX	$x_{38} + x_{31} - x_{37}$	$+f_{17} + f_{18} + 3f_{19} - f_{20} - f_{22}$	− ·091	− ·090999	− ·09100	− ·091
XX	$x_{36} + x_{30} - x_{38}$	$-f_{19} + 3f_{20} + f_{21} + f_{22}$	+	− ·090999	− ·09100	− ·091
XXI	$x_{36} + x_{33} - x_{35}$	$-f_{18} + f_{20} + 3f_{21}$	−	+ ·005998	+ ·00600	+ ·006
XXII	$x_{39} + x_{28} - x_{38}$	$+f_{16} - f_{19} + f_{20} + 3f_{22} + f_{23}$	+	− ·033003	− ·03300	− ·033
XXIII	$x_{40} + x_{39} - x_{41}$	$+f_{22} + 3f_{23} + f_{24}$	+	+ ·009001	+ ·00900	+ ·009
XXIV	$x_{42} + x_{26} - x_{41}$	$+f_{15} + f_{23} + 3f_{24} + f_{25}$	+	+ ·042002	+ ·04200	+ ·042
XXV	$x_{43} + x_{42} - x_{44}$	$+f_{24} + 3f_{25} + f_{26}$	+	+ ·089001	+ ·08900	+ ·089
XXVI	$x_{45} + x_{17} - x_{44}$	$+f_9 + f_{25} + 3f_{26} + f_{27}$	+	+ ·007000	+ ·00701	+ ·007
XXVII	$x_{46} + x_{45} - x_{47}$	$+f_{26} + 3f_{27} + f_{28}$	+			
XXVIII	$x_{49} + x_{46} - x_{48}$	$+f_{27} + 3f_{28} - f_{31}$	+ ·039	+ ·039001	+ ·03901	+ ·039
XXIX	$x_{52} + x_{50} - x_{53}$	$+3f_{29} + f_{30} + f_{31}$	− ·042	− ·042000	− ·04201	− ·042
XXX	$x_{54} + x_{53} - x_{55}$	$+f_{29} + 3f_{30}$	− ·046	− ·045999	− ·04601	− ·046
XXXI	$x_{50} + x_{49} - x_{51}$	$-f_{28} + f_{29} + 3f_{31}$	− ·002	− ·002001	− ·00201	− ·002

Table IX.—Final Results, and Comparison of Geodetic with Astronomical Values.

Distinguishing Number	Name of Arc	Computed Value of Arc	Correction by Simultaneous Reduction	Corrected Astronomical Value of Arc	Geodetic Value of Arc from the Triangulation	Excess of Geodetic above Astronomical Value
		m s	s	m s	m s	s
(1)	Mooltan–Quetta	17 43 499	+ 029	17 43 528	17 43 714	+0 186
(2)	Kurrachee–Quetta	0 1 603	− 029	0 1 574	0 1 436	−0 138
(3)	Mooltan–Kurrachee	17 41 976	− 022	17 41 954	17 42 278	+0 324
(4)	Agra–Deesa	23 20 370	+ 045	23 20 415	23 19 803	−0 612
(5)	Deesa–Kurrachee	20 40 529	+ 030	20 40 559	20 40 775	+0 216
(6)	Deesa–Mooltan	2 58 582	+ 023	2 58 605	2 58 497	−0 108
(7)	Agra–Kurrachee	44 0 992	− 018	44 0 974	44 0 578	−0 396
(8)	Agra–Mooltan*	26 19 053	− 033	26 19 020	26 18 300	−0 720
(9)	Amritsar–Mooltan	13 44 281	+ 004	13 44 285	13 43 737	−0 548
(10)	Peshawar–Mooltan	0 27 483	+ 013	0 27 496	0 26 192	−1 304
(11)	Amritsar–Peshawar	13 16 776	+ 013	13 16 789	13 17 545	+0 756
(12)	Agra–Amritsar	12 34 725	+ 010	12 34 735	12 34 563	−0 172
(13)	Dehra Dun–Agra	0 7 233	+ 032	0 7 265	0 9 348	+2 083
(14)	Dehra Dun–Amritsar	12 41 995	+ 005	12 42 000	12 43 911	+1 911
(15)	Fyzabad–Agra	16 27 995	+ 012	16 28 007	16 28 417	+0 410
(16)	Fyzabad–Dehra Dun	16 20 704	+ 038	16 20 742	16 19 069	−1 673
(17)	Fyzabad–Jubbulpore	8 45 040	− 028	8 45 012	8 44 369	−0 643
(18)	Jubbulpore–Agra	7 43 026	− 031	7 42 995	7 44 048	+1 053
(19)	Jubbulpore–Deesa	31 3 393	+ 017	31 3 410	31 3 851	+0 441
(20)	Jubbulpore–Bombay	28 31 816	− 043	28 31 773	28 32 901	+1 128
(21)	Jubbulpore–Kalianpur	9 10 323	000	9 10 323	9 11 003	+0 680
(22)	Agra–Kalianpur	1 27 319	+ 009	1 27 328	1 26 955	−0 373
(23)	Kalianpur–Bombay	19 21 441	+ 009	19 21 450	19 21 898	+0 448
(24)	Bombay–Kurrachee	23 12 215	− 019	23 12 196	23 11 725	−0 471
(25)	Bombay–Deesa ..	2 31 644	− 007	2 31 637	2 30 950	−0 687
(26)	Jubbulpore–Bolarum	5 42 935	+ 037	5 42 972	5 43 422	+0 450
(27)	Bolarum–Bombay†	22 48 785	+ 016	22 48 801	22 49 479	+0·678
(28)	Bolarum–Bellary ..	6 21 943	−·013	6 21 930	6 22 114	+0 184

* The mean of two measurements, one in 1885-86 and the other in 1889-90, is taken.
† The measurement of 1891-92 is taken vide Part I, Chapter VI, page 27

Table IX.—Final Results, and Comparison of Geodetic with Astronomical Values.—(Continued).

Distinguishing Number	Name of Arc	Computed Value of Arc	Correction by Simultaneous Reduction	Corrected Astronomical Value of Arc	Geodetic Value of Arc from the Triangulation	Excess of Geodetic above Astronomical Value
		m s	s	m s	m s	s
(29)	Bellary–Bombay	16 26 867	+ 004	16 26 871	16 27 365	+0 494
(30)	Bangalore–Bellary	2 37 230	− 003	2 37 227	2 37 374	+0 147
(31)	Bellary–Mangalore	8 19 653	− 041	8 19 612	8 19 791	+0 179
(32)	Mangalore–Bombay*	8 7 273	− 014	8 7 259	8 7 574	+0 315
(33)	Bangalore–Nagarkoil	0 35 708	− 010	0 35 698	0 35 775	+0 077
(34)	Nagarkoil–Mangalore	10 21 141	000	10 21 141	10 21 390	+0 249
(35)	Madras–Nagarkoil	11 15 006	+ 010	11 15 016	11 15 385	+0 369
(36)	Madras–Bangalore	10 39 331	− 013	10 39 318	10 39 610	+0 292
(37)	Madras–Mangalore	21 36 129	+ 028	21 36 157	21 36 775	+0 618
(38)	Madras–Bellary	13 16 567	− 022	13 16 545	13 16 984	+0 439
(39)	Madras–Bolarum	6 54 615	000	6 54 615	6 54 870	+0 255
(40)	Waltair–Madras	12 16 868	+ 006	12 16 874	12 16 612	−0 262
(41)	Waltair–Bolarum	19 11 525	− 036	19 11 489	19 11 482	−0 007
(42)	Waltair–Jubbulpore	13 28 501	+ 016	13 28 517	13 28 060	−0 457
(43)	Calcutta–Waltair	20 9 194	− 016	20 9 178	20 9 684	+0 506
(44)	Calcutta–Jubbulpore	33 37 702	− 007	33 37 695	33 37 744	+0 049
(45)	Calcutta–Fyzabad	24 52 661	+ 022	24 52 683	24 53 375	+0 692
(46)	Jalpaiguri–Calcutta	1 30 290	+ 015	1 30 305	1 30 933	+0 628
(47)	Jalpaiguri–Fyzabad	26 22 986	+ 002	26 22 988	26 24 308	+1 320
(48)	Chittagong–Calcutta	13 55 145	− 007	13 55 138	13 55 195†	+0 057
(49)	Chittagong–Jalpaiguri	12 24 816	+ 017	12 24 833	12 24 262†	−0 571
(50)	Akyab–Chittagong	4 14 252	− 004	4 14 248	4 14 236†	−0 012
(51)	Akyab–Calcutta	18 9 395	− 009	18 9 386	18 9 431†	+0 045
(52)	Prome–Akyab	9 16 262	− 024	9 16 238	9 16 556†	+0 318
(53)	Prome–Chittagong	13 30 472	+ 014	13 30 486	13 30 792†	+0 306
(54)	Moulmein–Prome	9 38 758	− 011	9 38 747	9 38 876†	+0 129
(55)	Moulmein–Akyab	18 54 974	+ 011	18 54 985	18 55 432†	+0 447

* The mean of two measurements, one in 1876-77 and the other in 1887 88, is taken.
† These geodetic values are liable to a further very small correction when the Burma Triangulation now in progress is completed and reduced.

CHAPTER II

ON LOCAL ATTRACTION AND THE EVIDENCE FOR THE NECESSITY OF CHANGES IN THE ADOPTED ELEMENTS OF THE EARTH S FIGURE

If the true figure of the earth be an oblate spheroid it is obvious that correct measurements of arcs of the meridian, combined with a knowledge of the astronomical latitudes of the terminal stations of the arcs, would suffice to give its form and dimensions But the diverse results obtained from measurements of this kind in various parts of the globe prove that this supposition is untenable Perhaps one of the greatest difficulties that has to be encountered is that known as local attraction, or a deviation of the plumb-line from the vertical caused (generally though not invariably) by the contiguity of mountain masses As the determination of astronomical latitude depends on the direction of the plumb-line (or what comes to the same thing, the position of the bubble in a spirit-level) any error in this direction, resolved along the meridian, produces a corresponding error in the latitude, and such erroneous latitude taken in conjunction with linear measures will fail obviously to give the true meridional curve A similar difficulty occurs in arcs of longitude, because, owing to local attraction either the bubble of the level employed in levelling the axis of the transit instrument is displaced, or the surface of the mercury used for levelling by reflection of the wires in the eye piece becomes inclined to the horizon, according to the method of levelling employed, and an error in the times of star transits is thus introduced, hence measurements of this kind produce contradictory results a study of the table giving the comparative lengths of the geodetic and astronomical arcs shows at once that local attraction is a quantity quite sensible to the measuring power of modern instruments, and is moreover in many cases such as we have been led to expect by previous experiments—(1) that the plumb-line is deflected towards mountain masses, and (2) that it is deflected towards the sea There are notable exceptions to these two conclusions, but the general tendency seems to bear them out Nothing definite or final can be arrived at until the latitude observations are completed, but by making some more or less probable assumptions, it is not difficult to gain some approximate knowledge both of the error of the assumed equatorial axis, and of the amount of local attraction at each station of observation

Colonel Clarke's investigations into this subject, in his valuable work entitled "Geodesy," show that in all probability the equator and the parallels of latitude are not circular, but elliptical · the rough

and ready method of computation here adopted does not pretend to enter into any refinement of this kind. The great preponderance of arcs in which the geodetic value exceeds the astronomical value shows roughly that the adopted curvature of India from east to west is too great, or in other words, that the adopted equatorial diameter is too small

It is necessary to distinguish clearly between the terms "geodetic value" and "astronomical value" used in this chapter The former is obtained from the triangulation by calculation, in which certain assumed elements of the earth's figure are adopted The latter is merely the difference of time at the two terminal stations at any instant, as obtained by astronomical observations The geodetic value of an arc of longitude is affected by any error in the adopted elements, whereas the astronomical value is affected only by local attraction, this last source of error being almost wholly inoperative in the case of geodetic values, that is to say, if

a_0 = the true value of any arc in seconds of time

a' = „ geodetic „ „

a'' = „ astronomical „ „

x_e = the displacement of the zenith in seconds of time at the eastern station (positive towards the east) owing to local attraction,

x_w = the same thing for the western station,

$1 + k$ = ratio of the true, to the adopted equatorial axis

Then we have these equations (very approximately)

$$a' = a_0(1 + k),$$

$$a'' = a_0 + x_e - x_w;$$

and subtracting

$$a' - a'' = a_0 k - x_e + x_w,$$

or

$$-x_e + x_w = d - a' k,$$

where d is the excess of the geodetic over the astronomical value As k is very small and a_0 very nearly equal to a', $a\,k$ may be substituted for $a_0 k$ without hesitation. Every measured arc will thus yield an equation of the above form

Now in order to apply this equation in the present case it will be convenient to present the list of data in another form In *Table IX* of the preceding chapter the geodetic and astronomical values are given for every arc, but in the subjoined table they are so arranged that all arcs are measured from Kalianpur as origin This is of course merely a matter of addition or subtraction amongst the figures given in the first table Moreover as the calculation pretends to be merely a rough approximation, only two places of decimals are retained, possibly it may be thought that even one place would suffice, but the additional labour of retaining two is insignificant

Table X.

Name and Number of Station		Arc and corresponding Symbol			Geodetic value of Arc	Reduced to seconds	Seconds of astronomical value	Excess of Geodetic over Astronomical value	
								In time	In arc
					h m s	s	s	s	″
Moulmein	(1)	Moulmein to Kalianpur,		a_1	1 19 53 61	4794	52 39	+1 22	+18 30
Prome	(2)	Prome	,,	a_2	1 10 14 73	4215	13 64	+1 09	+16 35
Akyab	(3)	Akyab	,,	a_3	1 0 58 18	3658	57 40	+0 78	+11 70
Chittagong	(4)	Chittagong	,,	a_4	56 43 94	3404	43 16	+0 78	+11 70
Jalpaiguri	(5)	Jalpaiguri	,,	a_5	44 19 68	2660	18 32	+1 36	+20 40
Calcutta	(6)	Calcutta	,,	a_6	42 48 75	2569	48 02	+0 73	+10 95
Waltair	(7)	Waltair	,,	a_7	22 39 06	1359	38 84	+0 22	+ 3 30
Fyzabad	(8)	Fyzabad	,,	a_8	17 55 37	1075	55 34	+0 03	+ 0 45
Madras	(9)	Madras	,,	a_9	10 22 45	622	21 97	+0 48	+ 7 20
Jubbulpore	(10)	Jubbulpore	,,	a_{10}	9 11 00	551	10 32	+0 68	+10 20
Bolarum	(11)	Bolarum	,,	a_{11}	3 27 58	208	27 35	+0 23	+ 3 45
Dehra Dun	(12)	Dehra Dun	,,	a_{12}	1 36 30	96	34 59	+1 71	+25 65
Agra	(13)	Agra	,,	a_{13}	1 26 96	87	27 33	−0 37	− 5 55
Kalianpur	(14)								
Bangalore	(15)	Kalianpur to	Bangalore	a_{15}	17 16	17	17 35	−0 19	− 2 85
Nagarkoil	(16)	,,	Nagarkoil	a_{16}	52 93	53	53 05	−0 12	− 1 80
Bellary	(17)	,,	Bellary	a_{17}	2 54 53	175	54 58	−0 05	− 0 75
Amritsar	(18)	,,	Amritsar	a_{18}	11 7 61	668	7 41	+0 20	+ 3 00
Mangalore	(19)	,,	Mangalore	a_{19}	11 14 32	674	14 19	+0 13	+ 1 95
Bombay	(20)	,,	Bombay	a_{20}	19 21 90	1162	21 45	+0 45	+ 6 75
Deesa	(21)	,,	Deesa	a_{21}	21 52 85	1313	53 09	−0 24	− 3 60
Peshawar	(22)	,,	Peshawar	a_{22}	24 25 15	1465	24 20	+0 95	+14 25
Mooltan	(23)	,,	Mooltan	a_{23}	24 51 35	1491	51 69	−0 34	− 5 10
Kurrachee	(24)	,,	Kurrachee	a_{24}	42 33 62	2554	33 65	−0 03	− 0 45
Quetta	(25)	,,	Quetta	a_{25}	42 35 06	2555	35 22	−0 16	− 2 40

In this table the names of the stations with a distinguishing number are given from east to west These numbers must not be confused with those used in the charts and in the simultaneous reduction Column 2 contains the names of all the arcs reckoned from Kalianpur as origin, eastwards and westwards, with a symbolical letter attached to each. In column 3 are shown the geodetic values of the arcs in time, the same values being given in seconds in column 4. Column 5 gives the seconds only of the astronomical values of the arcs, and columns 6 and 7 the excess of the geodetic over the astronomical values in time and in arc respectively It cannot fail to be noticed in this table how much more persistent the excess of the geodetic values is in the arcs east of Kalianpur than in those west of it This would lead to the idea that either the curvature on the former side is less than that on the latter, or that there is a sensible deflection of the zenith eastwards at Kalianpur, which makes all the observed western arcs appear too large. From these data the following equations are formed, in which x_1, x_2, &c., signify

the deflection, owing to local attraction, of the zenith at each station in seconds of time, eastwards or westwards, the former giving the positive sign

Each arc joining Kalianpur with any other station of observation produces an equation; those in which Kalianpur is the western station differing in sign from those in which that station is to the east —

$$
\begin{array}{lllll}
 & & & {}^{s} & {}'' \\
-x_{14}+x_{1} &= -1\ 22 + a_{1}k &= -0\ 26 &= - & 3\ 90 \\
-x_{14}+x_{2} &= -1\ 09 + a_{2}k &= -0\ 25 &= - & 3\ 75 \\
-x_{14}+x_{3} &= -0\ 78 + a_{3}k &= -0\ 05 &= - & 0\ 75 \\
-x_{14}+x_{4} &= -0\ 78 + a_{4}k &= -0\ 10 &= - & 1\ 50 \\
-x_{14}+x_{5} &= -1\ 36 + a_{5}k &= -0\ 83 &= - & 12\ 45 \\
-x_{14}+x_{6} &= -0\ 73 + a_{6}k &= -0\ 22 &= - & 3\ 30 \\
-x_{14}+x_{7} &= -0\ 22 + a_{7}k &= +0\ 05 &= + & 0\ 75 \\
-x_{14}+x_{8} &= -0\ 03 + a_{8}k &= +0\ 19 &= + & 2\ 85 \\
-x_{14}+x_{9} &= -0\ 48 + a_{9}k &= -0\ 36 &= - & 5\ 40 \\
-x_{14}+x_{10} &= -0\ 68 + a_{10}k &= -0\ 57 &= - & 8\ 55 \\
-x_{14}+x_{11} &= -0\ 23 + a_{11}k &= -0\ 19 &= - & 2\ 85 \\
-x_{14}+x_{12} &= -1\ 71 + a_{12}k &= -1\ 69 &= - & 25\ 35 \\
-x_{14}+x_{13} &= +0\ 37 + a_{13}k &= +0\ 39 &= + & 5\ 85 \\
-x_{14}+x_{15} &= -0\ 19 - a_{15}k &= -0\ 19 &= - & 2\ 85 \\
-x_{14}+x_{16} &= -0\ 12 - a_{16}k &= -0\ 13 &= - & 1\ 95 \\
-x_{14}+x_{17} &= -0\ 05 - a_{17}k &= -0\ 09 &= - & 1\ 35 \\
-x_{14}+x_{18} &= +0\ 20 - a_{18}k &= +0\ 07 &= + & 1\ 05 \\
-x_{14}+x_{19} &= +0\ 13 - a_{19}k &= +0\ 00 &= & 0\ 00 \\
-x_{14}+x_{20} &= +0\ 45 - a_{20}k &= +0\ 22 &= + & 3\ 30 \\
-x_{14}+x_{21} &= -0\ 24 - a_{21}k &= -0\ 50 &= - & 7\ 50 \\
-x_{14}+x_{22} &= +0\ 95 - a_{22}k &= +0\ 66 &= + & 9\ 90 \\
-x_{14}+x_{23} &= -0\ 34 - a_{23}k &= -0\ 64 &= - & 9\ 60 \\
-x_{14}+x_{24} &= -0\ 03 - a_{24}k &= -0\ 54 &= - & 8\ 10 \\
-x_{14}+x_{25} &= -0\ 16 - a_{25}k &= -0\ 67 &= - & 10\ 05
\end{array}
$$

In order to obtain the figures in the last two columns the value of k must be known There are in this schedule only twenty-four equations and (including k) twenty-six unknown quantities, it will be necessary therefore to make some assumptions They might be subjected to a solution by the method of minimum squares, but apart from the labour entailed by this method, which would be a wholly unnecessary refinement at this stage of the discussion, it seems doubtful if the principle of thereby getting the most probable solution would hold in this case, and therefore it seems profitable to make some arbitrary assumption.

It is almost impossible to make any assumption here to which no objection can be raised. Perhaps the best is based on the following considerations If local attraction does not exist at the terminals of any particular arc then k may be taken as $\frac{\text{excess of geodetic over astronomical value}}{\text{length of arc}}$, and extending the principle we will assume in absence of anything better that

$$k = \frac{\text{average excess of geodetic over astronomical values}}{\text{average length of arc}} = \frac{\text{sum of col } 6}{\text{sum of col } 4} \text{ in } \textit{Table X}$$

for a large number of arcs where the local attraction may be supposed to be more or less eliminated. There are, however, two arcs involving Dehra Dun and Agra which, besides being extremely short ones, show abnormal local attraction*, they are therefore omitted, and hence

$$k = \frac{8\ 20}{37242} = \ 000220,$$

it will suffice if we take $k =\ 0002$ This value being substituted in the schedule of equations given above produces the figures in the last two columns These now represent the *differences* between the zenith deflection at Kalianpur and every other station, in order to get the *actual* values another assumption is necessary We may make an unlimited number of such assumptions with more or less probability Among other fairly probable ones let us take the following three —

(1) That the zenith deflection east or west at Kalianpur is zero,

(2) That the *sum* of the zenith deflections at all the stations of observation is zero, and

(3) That the excess of the geodetic above the astronomical values averages the same amount in the eastern and western arcs, reckoning from Kalianpur

On the first supposition the figures as they stand in the last column of the preceding list of equations represent the absolute deflections

On the second supposition $3''\ 42$ must be added to each of these quantities in order to obtain the absolute deflections.

For the third supposition a constant x_{14}—representing the zenith deflection at Kalianpur—must be assumed such that the values of k, as deduced from the eastern and western arcs respectively, will be identical.

If k be derived from the eastern arcs as they stand at present in *Table X*, we have, omitting (12) and (13) as before

$$k = \frac{7\ 60}{25115},$$

and from the western arcs

$$k = \frac{0\ 60}{12127},$$

and x_{14} must be taken of such a magnitude that

$$k = \frac{7\ 60 - 11\,x_{14}}{25115} = \frac{0\ 60 + 11\,x_{14}}{12127},$$

the solution of which equation gives $x_{14} = 0''\ 188$ or $2''\ 82$.

---

* If these two arcs be included $k =\ 000235$.

If this number be added to each of those in the last column of the preceding schedule, we obtain the actual zenith deflections on the third supposition The stations in the following list are arranged in order of the magnitude of the deflection on all three assumptions —

Peshawar	+ 9 90	+ 13 32	+ 12 72	Bangalore	− 2·85	+ 0 57	− 0 03
Agra	+ 5 85	+ 9 27	+ 8 67	Calcutta	− 3 30	+ 0 12	− 0 48
Bombay	+ 3 30	+ 6 72	+ 6 12	Prome	− 3 75	− 0 33	− 0 93
Fyzabad	+ 2 85	+ 6 27	+ 5 67	Moulmein	− 3 90	− 0 48	− 1 08
Amritsar	+ 1 05	+ 4 47	+ 3 87	Madras	− 5 40	− 1 98	− 2 58
Waltair	+ 0 75	+ 4 17	+ 3 57	Deesa	− 7 50	− 4 08	− 4 68
Kalianpur	0 00	+ 3 42	+ 2 82	Kurrachee	− 8 10	− 4 68	− 5 28
Mangalore	0 00	+ 3 42	+ 2 82	Jubbulpore	− 8 55	− 5 13	− 5 73
Akyab	− 0 75	+ 2 67	+ 2 07	Mooltan	− 9 60	− 6 18	− 6 78
Bellary	− 1 35	+ 2 07	+ 1 47	Quetta	− 10 65	− 6 63	− 7 23
Chittagong	− 1 50	+ 1 92	+ 1 32	Jalpaiguri	− 12 45	− 9 03	− 9 63
Nagarkoil	− 1 95	+ 1 47	+ 0 87	Dehra Dun	− 25 35	− 21 93	− 22 53
Bolarum	− 2 85	+ 0 57	− 0 03				

It is worthy of remark that if we take $1 + k$ at $1\ 000220$, as deduced above, it brings the earth's equatorial radius into much closer accordance with Colonel Clarke's value than that which has been hitherto used in the Indian geodesy under the name of Everest's Constants, 1st set. In this set $a = 20{,}922{,}932$ feet, and $a \times 1\ 000220 = 20{,}927{,}535$ feet, which is much nearer to Colonel Clarke's latest value, *viz*, 20,926,202 feet, as given at page 319 of his "Geodesy" published in 1880

At page 309 of the same work Colonel Clarke, after showing his reasons for believing that the equator is an ellipse of small excentricity, writes thus —"The meridian containing the smaller diameter "of the equator passes through Ceylon on the one side of the earth, and bisects North America on the "other This position of the axes, brought out by a very lengthened calculation, certainly corresponds "very remarkably with the physical features of the globe—the distribution of land and water on its "surface" The rough analysis of the longitude arcs given above certainly bears this out, inasmuch as it shows that the curvature in India is flatter than that due to the assumed spheroid with circular equator as would necessarily be the case if India were situated, as Colonel Clarke supposes, near the extremity of the minor axis of the equatorial ellipse

APPENDICES.

APPENDIX.

No. 1.

DETERMINATION OF THE GEODETIC ELEMENTS OF THE LONGITUDE STATIONS

1.

General Remarks

All the points used as longitude stations are connected with the stations of the Great Trigonometrical Survey, in order that their geodetic latitudes and longitudes may be accurately determined The longitude stations at Deesa, Madras, Bangalore, Mangalore, and Bombay were selected so close to principal stations that simple linear measurements sufficed for their connection, and the resulting deduced elements, with the descriptions of the stations, are given in the Appendix to Part I of Volume IX The longitude stations at Dehra Dun and Quetta were also connected with fixed stations by linear measurements, and the deduced geodetic elements are given in *Tables A, B* and *C* in this volume

Owing to the extension of the Survey of India Offices in Calcutta, the longitude station of 1881-82, 1882-83, and 1883-84, described in Appendix to Volume X, could not be used in 1891-92, but a new point was selected close to the old station, and the necessary linear measurements taken to determine the geodetic elements The longitude station at Bolarum of seasons 1875 76 and 1880-81, and described in Appendix to Volume IX, having been built over, a new station was selected in 1891 92, close to the old point, and connected with it by measurements detailed below

To fix the longitude stations at Agra, Kurrachee, Jubbulpore, Bellary, Fyzabad, Mooltan, Amritsar, Peshawar, Nagarkoil, and Waltair, special triangulation was necessary in each case The triangulation for the first five stations is given in Appendices to Volumes IX and X, while the triangulation for the other stations, executed by Captain S G, Burrard, R E., and Messrs McNair and Bond, will be found in *Tables A, B* and *C*, with explanatory diagrams in Plates VII and VIII

The latitudes, longitudes and azimuths were computed by the formulæ given on pages 1"1 to 124, Volume II of the *Account of the Operations of the Great Trigonometrical Survey of India*, using the elements of the figure of the earth as stated on page 127 of that volume The elements of all trigonometrical stations and points employed, with the exception of the station at Quetta, are final, and are for the most part published in the printed records of the Great Trigonometrical Survey of India, to which references are given. All the stations and points used were clearly identified, and their exact positions recovered beyond doubt.

2.

Descriptions of Stations and Points of the Connecting Triangulation, and of those at which the Longitude Observations were taken.

AGRA CONNECTION.

See Appendix, Volume X.

MOOLTAN CONNECTION

MOOLTAN CITY DOME is an intersected point of the Mooltan–Shujabad–Khangarh Secondary Series emanating from the Sutlej Series: it is the spire of the dome of Mir Ahmad Shah's Mausoleum, which lies 1½ miles N.E. of the Mooltan Cantonments, and immediately east of the village of Suri Miani

MOOLTAN FORT DOME is also an intersected point of the Mooltan–Shujabad–Khangarh Secondary Series it is the spire of the large dome of Shah Rukhn-ul-Alam's Mausoleum

MOOLTAN TELEGRAPH OFFICE STATION is situated at the N W angle of the *paka* roof of the Government Telegraph Office A circle and dot engraved on a stone let into the roof marks the station It is 2 83 feet from an arrow on the western parapet, 8 08 feet from the S W corner of the westerly of the two northern chimneys, and 9·96 feet from the N W corner of the single central chimney

MOOLTAN LONGITUDE STATION not being visible from Mooltan Telegraph Office Station, a peg on the meridian of the Longitude Station, and 40 78 feet north of it, was observed to, and its distance from the Telegraph Office Station found by direct measurement to be 138 37 feet on an azimuth of 227° 11′ 17″ 4

DEESA CONNECTION

See Appendix, Volume IX

AMRITSAR CONNECTION

RAMBAGH STATION is a station of the Bari Doab Secondary Series emanating from the Gurhagarh Meridional Series: it is situated on the roof of the highest building of the Ram Bagh, at present (1885) in the occupancy of the Amritsar Station Library When Mr McNair visited the station in 1885, he found that the marble slab, which marked the station, had been removed, but, having recovered the site, he embedded a stone with a circle and dot engraved on it, in place of the marble slab

AMRITSAR MINARET STATION is a station of the Bari Doab Secondary Series emanating from the Gurhagarh Meridional Series it is situated on the platform of the north eastern of the two minarets built by Sardar Jodh Sing Ramgaria, situated about the centre of the city, and some 150 yards E of the celebrated Golden temple The station is marked by a circle and dot on a piece of marble let into the masonry, and covered over with a layer of mortar

AMRITSAR GOVINDGARH FORT STATION is on the roof of the highest building, used as a hospital in 1885, inside the fort of Govindgarh which lies W N W of the city of Amritsar The station is denoted by a circle and dot cut on a slab of stone let into the roof The building described in Synoptical Volume IV, page 97—, as "The old house", on which the station of the Bari Doab Secondary Series was situated, was not in existence in 1885

AMRITSAR HALL GATEWAY STATION is on the roof of the western tower of the Hall Gateway, which is the main north entrance into the city of Amritsar A circle and dot engraved on a stone embedded in the roof marks the station

AMRITSAR, GHAGAR MAL'S HOUSE STATION is on the roof of the western entrance to Ghagar Mal Sett's house A circle and dot engraved on a slab of sandstone embedded in the masonry marks the station

AMRITSAR LONGITUDE STATION is situated in the compound of the Government Telegraph Office, and about 20 feet to the west of the main building

KURRACHEE CONNECTION

See Appendix, Volume IX

PESHAWAR CONNECTION

PIR SABAK HILL STATION is one of Lieutenant Carter's stations of the Peshawar Secondary Series, which emanates

from the Great Indus Series. It is situated on the summit of a hill E. of Pir Sabak village on the left bank of the Kabul river; marked by a pillar with a circle and dot engraved on the rock *in situ*.

JALALA SIR HILL STATION is one of Lieutenant Carter's stations of the Peshawar Secondary Series, which emanates from the Great Indus Series It is situated on Jalala peak of the Khatak range which divides the districts of Peshawar and Kohat, and lies 4 5 miles east of the Afridi village of Janakher, and 5 miles west of the hill cantonment and sanitarium of Cherat. A well marked foot-path leads from Cherat to the station, and is the best approach to it. The station is marked by a circle and dot cut on stone, covered with a cairn of stones

PESHAWAR, GHOR KHATRI STATION is situated near the N E corner of the roof of the western of the two buildings known as the Ghor Khatri, once a Buddhist monastery, then rebuilt into a Hindu temple, and now used as a *sarai* A circle and dot engraved on a slate slab embedded in the mud roof marks the station. This station is *not* identical with Peshawar Gurkatri s of the Peshawar Secondary Series of Synoptical Volume I

PESHAWAR TELEGRAPH OFFICE STATION is at the east end of the roof of the main building of the Government Telegraph Office, and just above the room in which the astronomical clock was mounted. A circle and dot engraved on a slate slab let into the mud roof marks the station

PESHAWAR LONGITUDE STATION is in the compound of the Government Telegraph Office, and is 15 3 feet south and 54 feet east of Telegraph Office Station

DEHRA DUN CONNECTION

DEHRA DUN LONGITUDE STATION is situated in the north-eastern portion of the Survey of India Office compound, 33 54 feet north of the Haig Observatory, 214 feet from the western gate post of the N E entrance to the Survey property, 43 5 feet from the northern boundary wall measured on the ray to the Mussoorce eastern meridian mark, and 628 8 feet due east of the smaller Photo-heliograph Observatory called Dehra Dun Dome Observatory T S (new) in Synoptical Volume II

MADRAS CONNECTION

See Appendix, Volume IX

BANGALORE CONNECTION

See Appendix, Volume IX

NAGARKOIL CONNECTION.

RADHAPURAM STATION is a principal station of the Great Arc Meridional Series, Section 8° to 18° It is situated on the high plateau, about 1¾ miles N E by N of the village of Radhapuram on the road from Idindakarai on the coast to the town of Nanguneri, and 8½ miles E S E of the large village of Panagudi It is in the lands of the village of Radhapuram, sub-division Radhapuram, taluk Nanguneri, district Tinnevelly When visited by Mr Bond in January 1888, the station pillar, 10 feet high, and protecting pillar were found in perfect preservation The protecting pillar, surmounted by a conical capping stone, was removed for the observations, and on the completion of the work, was rebuilt of the former dimensions and the capping stone replaced For further description *vide* page 24—A of Volume XII of the *Account of the Operations of the Great Trigonometrical Survey of India.*

KUDANKULAM OBSERVATORY STATION is a principal station of the Great Arc Meridional Series, Section 8° to 18° It is situated on the highest point of an excessively rocky and thorn-covered swell of gently undulating ground about four-fifths of a mile from the sea coast, and 12 miles N E by E of the extreme point of Cape Comorin. It is in the lands of the village of Vijayapati, taluk Nanguneri, district Tinnevelly For further description *vide* page 25—A of Volume XII of the *Account of the Operations of the Great Trigonometrical Survey of India*

The station was visited by Mr Bond on the 15th December 1887 On opening the entrance to the observatory it was found that all the wood-work supporting the eastern half of the roof had been completely destroyed by white-ants, and the *débris* lay upon the floor of the building the western half of the roof was almost in the same state The two large beams supporting the sides of the meridional aperture in the roof were hanging loosely from the wall On clearing away the *débris* the eastern half of the floor of the building was found to be *paka*, and in the centre, in line with the meridional opening, was a granite slab 3·25 feet in diameter, in which a cylindrical hole had been bored and the following

inscription engraved on it "*Great Trigonometrical Survey, Kudankolam Observatory, Cape Comorin Base Extension* "A.D 1869"

MANPOTTAI HILL STATION is a principal station of the Great Arc Meridional Series, Section 8° to 18° It is situated on a rock on the summit of a hill, which lies about a mile S E of the junction of the roads from Travancore and Cape Comorin to the town of Nanguneri, ¾ of a mile E of the road from Cape Comorin to Panagudi, and 840 yards S. of the Aramalai and Tiruchendur road The station is about 8 miles from the sea, and is identical with that of "Munpotha" of Colonel Lambton's triangulation, the mark of which was found engraved on the rock, and adopted for the present station It is in the lands of Perungudi village, sub-division Radhapuram, taluk Nanguneri, district Tinnevelly

The station consists of a platform of stones and earth, 16 feet square and 8 feet high at the outer sides, enclosing a solid, circular and isolated pillar of masonry 3½ feet in diameter, which contains two marks, one on a stone embedded in the upper surface of the pillar, and the other 1 5 feet below it, engraved on the rock The directions and distances of the neighbouring villages are:—Panagudi N, 3¾ miles, Tanakarakulam (on the road) N E by E, 3½ miles; Koilkinar N N E., ¾ mile, Paluvur (on the road to Cape Comorin) S, 4 miles, and Perungudi E N E, 2 miles

The station was visited by Mr Bond on the 15th January 1888 and found intact, but without a protecting pillar After the completion of observations, a pyramidal covering pile of stones was erected 7 feet in diameter at base, and 8 feet in height

THOVALAMALAI HILL STATION is on Kanniakurchi, the highest peak of the Thovalamalai range, situated 7 miles N.E of Nagarkoil, and about a mile east of the high road to Tinnevelly It is in line with the old fortification wall extending from Poigaimalai (about ½ a mile N of Aramalai) southward to the coast The ascent which can only be made from the south side along the fortification wall is exceedingly steep It is in the Taurur pravarti, Agasteshwaram taluk of the southern division of Travancore The following are the directions and distances of the surrounding places:—Malangur S W by S, miles 3½, Ramapuram temple W by S, miles 3½, Thovala N W by W, miles 2, and Palaur E by S, miles 3

The station consists of a platform of earth and stones 7½ feet square enclosing a solid, isolated pillar of masonry, 3 feet in diameter and 2 feet in height, with two marks, one on the rock *in situ* and another at the surface of the pillar

TATAKAMALAI HILL STATION is on the top of a steep hill, called Thadagaimalai, some 3,000 feet above the plain and about 2 miles N of the high road This is an intersected point of the Great Arc Meridional Series, Section 8° to 18°, and was called by Colonel Branfill "Camel's hump h" Nagarkoil lies 7 miles S S W, Puthapandi 3 miles S W by W, and Aramalai 3 miles S E It is situated in the Thovala pravarti and taluk of the southern division of Travancore The path to the summit starts from the village of Sithapal, following the road to Aramalai for a distance of 2 miles, and thence leads up the southern face of the hill

The station, which is 95 feet from the southern extremity of the hill, consists of a solid, isolated pillar of masonry, 3 feet in diameter and 2 feet in height, surrounded by a platform of earth and stones 7½ feet square, with a mark engraved on the rock *in situ* and another at the surface of the pillar

AMRITWAMALAI HILL STATION is on the highest sharp conical peak of a rocky hill of that name, so called from the medicinal herbs found there It rises about 1,400 feet above the level of the country, and lies about 5 miles N W of Cape Comorin On the southern face of the hill and about 400 feet above the plain is a temple of Paramarth-linge-swami It is in the pravarti and taluk of Agasteshwaram of the southern division of Travancore

The station consists of a solid, circular and isolated pillar of masonry, 3 feet in diameter and 2 feet in height, surrounded by a platform of stones and earth 7½ feet square, with two marks, one on a stone embedded in the upper surface of the pillar, and the other engraved on the rock *in situ* The directions and distances of the neighbouring villages are:—Tambarkulam W, miles 2, Mailadi N, miles 1¾, and Kotaram S E, miles 3

NAGARKOIL LONGITUDE STATION is in the compound of the Traveller's Bungalow The following directions and measurements were taken from the station to the building:—N W corner of verandah S.E by S, 60 17 feet, N E. corner of plinth of building S E by E, 87 75 feet The station is denoted by a mark-stone embedded in a small masonry pillar 2 5 feet below the ground level, which is built between the transit piers It is in the Kotar pravarti, Agasteshwaram taluk of the southern division of Travancore

MANGALORE CONNECTION.

See Appendix, Volume IX

BELLARY CONNECTION.

See Appendix, Volume IX

BOMBAY CONNECTION

See Appendix, Volume IX.

KALIANPUR CONNECTION

KALIANPUR HILL STATION is a principal station of the Sironj Base-Line Figure, and is the origin of the latitudes and longitudes of the whole Indian Survey It is situated on a flat elevated ridge of iron-clay formation, locally called Bhuri Tori, which skirts the Sironj valley to the S W and N, and separates Malwa from the table land to the north The main road from Bhopal, *vid* Bhilsa and Sironj, to the Cantonment of Goona passes 350 yards N E. of the station. The circumjacent villages with their distances and bearings are —Kalianpur ¾ mile S E, Jalalpur 1 mile S W by W., Barenda 1¾ miles N W, Karimabad 1¾ miles E, and the town of Sironj 2¼ miles E S E The station is situated in the Tonk State of the Rajputana Agency

The station is marked by a solid, isolated pillar of masonry, 2 feet high, containing mark-stones at top and bottom, and enclosed in a platform of solid masonry 14½ feet square

There are two meridional pillars connected with this station, one to the north at a distance of 5773 9 feet, and the other to the south at a distance of 6056 8 feet, on both of which the meridian of the station is accurately marked

The Kalianpur Observatory, erected by Colonel G Everest in 1824 for astronomical observations, stands 40 feet due west of this station

KALIANPUR LONGITUDE STATION is on the same ridge as, and 35 21 feet due south of Kalianpur Hill Station.

JUBBULPORE CONNECTION

See Appendix, Volume X

QUETTA CONNECTION

MASHELAK HILL STATION is a station of the Quetta Secondary Series which emanates from the Great Indus Series, and is situated on one of the highest peaks of the Mashelak range, which lies about fourteen miles due west of the Quetta Cantonments The metalled road from Quetta to Gulishtan passes 4½ miles N E of the station, while the Ghoghar pass is 8 miles S S W The village of Babazai is 3 miles to the S E, and that of Bazai 3 miles E by N

The station is marked by a circular and isolated masonry pillar 2½ feet high containing two mark stones, one at the surface, and the other at the ground level

TAKATU HILL STATION is a station of the Quetta Secondary Series which emanates from the Great Indus Series, and is situated on the highest peak of the western extremity of the Takatu range, which lies about eight miles due north of the Quetta Cantonments The station is immediately above a spring of water known as Chashma, and the circumjacent villages with their distances are —Kuchlak (a railway station of the Quetta Loop Line) 8 miles N N W, Samali 3 miles W N W, Malasai 2¾ miles W by S, Sara Ghurgi 2¾ miles S E The road from Quetta to Kil'h Abdulla Khan passes 1¼ miles W S W of the station

The station is marked by a circular, isolated pillar of masonry 2½ feet high with two mark-stones, one at the surface and the other at the ground level

QUETTA TELEGRAPH OFFICE STATION is a station of the Quetta Secondary Series which emanates from the Great Indus Series It is situated in the compound of the house occupied by the Deputy Superintendent of Telegraphs, Quetta Division, and lies between the house and an out-office east of the house It is 58 33 feet from the S E corner of the house, and 66 5 feet from the south corner of the out-office

The station consists of a platform enclosing a circular, isolated pillar of masonry having a wooden peg in its centre with two lines cut on it.

QUETTA LONGITUDE STATION is in the same compound as the Quetta Telegraph Office Station, and lies 22 25 feet east and 8·08 feet south of it.

CALCUTTA CONNECTION

CALCUTTA LATITUDE STATION is a secondary station of the Calcutta Longitudinal Series. It is about 25 yards

east of the building known as No. 9 Park Street, formerly occupied by the Government Mathematical Instrument Office. The station is denoted by a mark-stone over which a protecting pillar of stone slabs has been built. It is capped by a marble stone, on which the following inscription is engraved —"This stone marks an astronomical station of the G T. "Survey, where the latitude was observed by Mr H. Taylor in 1864-65."

CALCUTTA LONGITUDE STATION lies 32 75 feet north and 31 375 feet east of the Calcutta Latitude Station. It is *not* identical with the Calcutta Longitude Station described in Appendix to Volume X, which stood 20 3 feet due north of the Latitude Station, and was destroyed when the new building for housing the Mathematical Instrument Office was built; but a correction has been made to all arcs measured at this new point to reduce them from it to the old site.

WALTAIR CONNECTION.

WALTAIR HILL STATION is a secondary station of the Bider Longitudinal Series, and is situated in the district of Vizagapatam It is on the sea coast between the towns of Vizagapatam and Waltair A pillar of masonry 4 feet in height marks the station, which stands on a sand hill close to the cantonment of Waltair

WALTAIR HELIOTROPE STATION is a secondary station of the Bider Longitudinal Series, and is situated on a sand hill about ½ a mile N E of the town of Waltair

WALTAIR AUXILIARY STATION is denoted by a circle and dot cut on the rock *in situ*, on the southern slope of the Demru-Simashilem range. It is situated in the taluk and district of Vizagapatam

WALTAIR, NARSING RAO'S HOUSE, the point referred to is the western end of the gable of Narsing Rao's house in the town of Waltair

WALTAIR LONGITUDE STATION is in the enclosure of Narsing Rao's house, and lies 95 50 feet east, and 44 25 feet south of the western end of the gable of the house The longitude station of Vizagapatam, now destroyed, is distant 3 0837 miles on an azimuth of 38° 0′ 6″ 7

BOLARUM CONNECTION

LACHHMANPUR HILL STATION is a station of the Hyderabad Minor Series which emanates from the Great Arc Meridional Series, Section 8° to 18° It is situated on the highest rock of a rugged hill about a mile S E by S of the village of the same name, 1½ miles N of Nizampet, 2½ miles S S W of Baurampet, and 6½ miles N E of Lingampalle Railway Station of the Nizam's State Railway A cart track from Nizampet to Baurampet passes close to the station It is in the Atraf i Balda district of the Nizam's Dominions The station is marked by a circle and dot on the rock *in situ*, with an isolated masonry pillar built over it, having a mark stone on the top, and surrounded by a temporary platform of stones and earth

HYDERABAD, NAUBATPAHAR HILL STATION is a station of the Hyderabad Minor Series emanating from the Great Arc Meridional Series, Section 8° to 18° It is situated on the northern peak of a low hill 200 yards S of the south end of the Husain Sagar tank, and equi-distant from the cantonments of Secunderabad and the city of Hyderabad on the N and S respectively The station is denoted by a circle and dot on a large stone embedded in a rough platform of stones and earth. It is in the Atraf-i-Balda district of the Nizam's Dominions

BOLARUM P W D. OFFICE STATION is on the roof of the N W wing of the Public Works Office at Bolarum, a cantonment of the Hyderabad Contingent The following measurements were taken to fix the point of observation :— N.E corner of parapet of roof 12 25 feet, N W corner of parapet of roof 32 5 feet, S W corner of parapet of roof 33 202 feet, and S E corner of parapet of roof 12 125 feet. A circle and dot cut on the roof, was covered with an earthen pan, and a masonry pillar 15 inches square and 12 inches high built over it The pillar was then plastered and white-washed, and a capping stone marked thus $\boxed{\frac{\text{G}\ |\ \text{T}}{\text{S.}}}$ embedded on the surface, the junction of the grooves being plumbed over the mark on the roof

BOLARUM LONGITUDE STATION is in the compound of the Public Works Office, and 221 68 feet north and 16 894 feet west of Bolarum P W D Office Station. This station is 16 894 feet west, and 24 17 feet south of the Longitude Station described in Appendix to Volume IX. A correction has been applied where necessary to reduce all arcs to the old station.

FYZABAD CONNECTION.

See Appendix, Volume X.

TABLE 4. TRIANGULATION FOR THE CONNECTION OF LONGITUDE STATIONS.

Computation of Triangles.

Longitude Station to be fixed	Theodolite used	No of Triangle	Name of Station	Observed Angle	Corrections for Spherical Excess	Corrections for Observation Error	Corrected Angle	Distance in Log Feet	Distance in Feet	Distance in Miles
	Inch			° ′ ″	″	″	° ′ ″			
MOOLTAN	12	1	Mooltan City Dome	54 14 19 4			54 14 19 4	4 0639889	11587 5	2 195
			Mooltan Fort Dome				63 45 5 9	4 1074593	12807 4	2 426
			Mooltan Telegraph Office s	62 0 34 7			62 0 34 7	4 1006961*	12609 4	2 388
			Sums				180 0 0 0			
AMRITSAR	12	2	Rambagh s	51 11 2 8		− 0 1	51 11 2 7	3 7661667	5836 7	1 105
			Amritsar Minaret „	68 6 41 7		− 0 1	68 6 41 6	3 8420444	6951 0	1 316
			Amritsar Govindgarh Fort „	60 42 15 8		− 0 1	60 42 15 7	3 8151074†	6532 9	1 237
			Sums	180 0 0 3		− 0 3	180 0 0 0			
	„	3	Amritsar Govindgarh Fort s	14 28 10 8		− 1 5	14 28 9 3	3 4515506	2828 5	0 536
			Rambagh „	23 24 46 1		− 1 5	23 24 44 6	3 6530224	4498 0	0 852
			Amritsar Hall Gateway „	142 7 7 6		− 1 5	142 7 6 1	3 8420444*	6951 0	1 316
			Sums	180 0 4 5	..	− 4 5	180 0 0 0			
	„	4	Rambagh s	27 27 11 6		− 1 3	27 27 10 3	3 1154302	1304 5	0 247
			Amritsar Hall Gateway „	60 59 13 3		− 1 4	60 59 11 9	3 3934748	2474 4	0 469
			Amritsar, Ghagar Mal s House	91 33 39 2		− 1 4	91 33 37 8	3 4515506	2828 5	0 536
			Sums	180 0 4 1		− 4 1	180 0 0 0			
	„	5	Amritsar Hall Gateway s	81 7 55 8		0 0	81 7 55 8	3 6518664*	4486 1	0 850
			Amritsar Govindgarh Fort „	16 41 47 2		0 0	16 41 47 2	3 1154263	1304 4	0 247
			Amritsar, Ghagar Mal s House „	82 10 17 1		− 0 1	82 10 17 0	3 6530224	4498 0	0 852
			Sums	180 0 0 1		− 0 1	180 0 0 0			
	„	6	Amritsar Ghagar Mal s House s	25 41 1 0		+ 1 0	25 41 2 0	2 9212206	834 1	0 158
			Amritsar Hall Gateway „	16 59 16 4		+ 1 0	16 59 17 4	2 7499679	562 [illegible]	0 107
			Amritsar Longitude „	137 19 39 6		+ 1 0	137 19 40 6	3 1154283‡	1304 5	0 247
			Sums	179 59 57 0	..	+ 3 0	180 0 0 0			
PESHAWAR	12	7	Pir Sabak h.s.	51 5 14 1	− 0 9	+ 0 7	51 5 13 9	5 0556354	113667 3	21 528
			Jalala Sir „	81 59 28 6	− 1 0	+ 0 7	81 59 28 3	5 1603410	144657 8	27 397
			Peshawar, Ghor Khatri s.	46 55 18 0	− 0 9	+ 0 7	46 55 17 8	5 0281711§	106701 6	20 209
			Sums	180 0 0 7	− 2 8	+ 2 1	180 0 0 0			

* Computed from the latitude and longitude taken from the final computations of the Mooltan-Shujabad-Khangarh Secondary Series
† Taken from the final computations of the Gurhagarh Meridional Series.
‡ Mean deduced from triangles Nos. 4 and 5.
§ Taken from the final computations of the Great Indus Series.

TABLE A. TRIANGULATION FOR THE CONNECTION OF LONGITUDE STATIONS.

Computation of Triangles—(Continued)

Longitude Station to be fixed	Theodolite used	No of Triangle	Name of Station		Observed Angle	Corrections for Spherical Excess	Corrections for Observation Error	Corrected Angle	Distance in Log Feet	Distance in Feet	Distance in Miles
					° ′ ″	″	″	° ′ ″			
	Inch										
PESHAWAR	12	8	Peshawar, Ghor Khatri	s	126 35 48 6	− 0 1	− 2 8	126 35 45 7	5 0773992	119508 6	22 634
			Jalala Sir	h.s	3 37 14 4	0 0	− 2 8	3 37 11 6	3 9730437	9398 2	1 780
			Peshawar Telegraph Office	s	49 47 5 6	− 0 1	− 2 8	49 47 2 7	5 0556354	113667 3	21 528
			Sums		180 0 8 6	− 0 2	− 8 4	180 0 0 0			
NAGARKOIL	12	9	Radhapuram	S	61 8 7 1		− 2 1	61 8 5	4 7764056	59759	11 318
			Kudankulam Observatory	s	82 39 4 6		− 3 6	82 39 1	4 8304389	67677	12 818
			Thovalamalai	h s	36 12 56 8		− 2 8	36 12 54	4 6054748*	40316	7 636
			Sums		180 0 8 5		− 8 5	180 0 0			
	"	10	Manpotta.	H S	91 50 32 8		− 4 8	91 50 28	4 7764056	59759	11 318
			Kudankulam Observatory	S	25 56 19 2		− 3 2	25 56 16	4 4175035	26152	4 953
			Thovalamalai	h s	62 13 16 9		− 0 9	62 13 16	4 7234518*	52900	10 019
			Sums		180 0 8 9		− 8 9	180 0 0			
	"	11	Manpottai	H S.	51 57 30 6		+ 3 4	51 57 34	4 4343137	27184	5 148
			Thovalamalai	h s	78 46 52 1		− 0 1	78 46 52	4 5296427	33857	6 412
			Tatakamalai	"	49 15 36 7		− 2 7	49 15 34	4 4175035	26152	4 953
			Sums		179 59 59 4		+ 0 6	180 0 0			
	"	12	Thovalamalai	h s.	91 29 18 2		+ 0 8	91 29 19	4 8263041	67035	12 696
			Kudankulam Observatory	S	25 29 34 2		− 2 2	25 29 32	4 4603114	28861	5 466
			Amritwamalai	h s	63 1 6 2		+ 2 8	63 1 9	4 7764056	59759	11 318
			Sums		179 59 58 6		+ 1 4	180 0 0			
	"	13	Tatakamalai	h s	69 32 55 7		+ 3 3	69 32 59	4 5470604	35242	6 675
			Thovalamalai	"	64 10 8 5		+ 0 5	64 10 9	4 5296152	33854	6 412
			Nagarkoil Longitude	s	46 16 56 0		− 4 0	46 16 52	4 4343137	27184	5 148
			Sums		180 0 0 2		− 0 2	180 0 0			
	"	14	Thovalamalai	h.s.	63 20 25 4		− 1 4	63 20 24	4 5326410	34091	6 457
			Amritwamalai	"	67 29 50 1		− 3 1	67 29 47	4 5470606	35242	6 675
			Nagarkoil Longitude	s.	49 9 45·9		+ 3 1	49 9 49	4 4603114	28861	5 466
			Sums		180 0 1 4		− 1 4	180 0 0			

* Taken from Triangle No. 478, page 158—4 of the Great Arc Series, Section 8° to 18°, Volume XII of the *Account of the Operations, &c.*

TABLE A. TRIANGULATION FOR THE CONNECTION OF LONGITUDE STATIONS.

Computation of Triangles—(Continued).

Longitude Station to be fixed	Theodolite used	No. of Triangle	Name of Station		Observed Angle	Corrections for		Corrected Angle	Distance in		
						Spherical Excess	Observation Error		Log Feet	Feet	Miles
	Inch				° ′ ″	″	″	° ′ ″			
QUETTA	14	15	Mashelak	h.s	35 30 55 20	− 0 24	+ 0 28	35 30 55 24	4 6505058	44720 4	8 470
			Takatu	"	81 38 23 19	− 0 24	+ 0 29	81 38 23 24	4 8817491	76163 9	14 425
			Quetta Telegraph Office	s	62 50 41 47	− 0 24	+ 0 29	62 50 41 52	4 8356685*	68496 5	12 973
			Sums		179 59 59 86	− 0 72	+ 0 86	180 0 0 00			
WALTAIR	6	16	Waltair	h s	35 41 11 0		+ 18 8	35 41 30	3 9748418	9437 2	1 787
			Waltair Heliotrope	s.	119 13 8 5		+ 18 9	119 13 27	4 1497313	14116 6	2 674
			Waltair Auxiliary	"	25 4 44 0		+ 18 8	25 5 3	3 8361720†	6857 6	1 299
			Sums		179 59 3 5		+ 56 5	180 0 0			
	"	17	Waltair Heliotrope	s.	70 20 16			70 20 16	3 9508844	8930 7	1 691
			Waltair Auxiliary	"	13 59 16			13 59 16	3 3602786	2292 3	0 434
			Waltair, Narsing Rao's House					95 [illegible] 28	3 9748418*	9437 2	1 787
			Sums					180 0 0			
BOLARUM	12	18	Lachhmanpur	h s.	44 17 19 [illegible]	− 0 1	+ 0 5	44 17 19 5	4 5966370	39503 4	7 482
			Hyderabad, Naubatpahar	"	57 56 43 0	− 0 1	+ 0 5	57 56 43 4	4 6807721	47947 9	9 081
			Bolarum P W D Office	s	77 45 56 7	− 0 2	+ 0 6	77 45 57 1	4 7426340‡	55288 4	10 471
			Sums		179 59 58 8	− 0 4	+ 1 6	180 0 0 0			

* Taken from the field computations of the Quetta Secondary Series, which are not in terms of the final reduction of the Triangulation of the Great Trigonometrical Survey

† Computed from the latitude and longitude taken from page 65—D of the Bider Longitudinal Series, Synoptical Volume X.

‡ Taken from the final computations of the Great Arc Meridional Series, Section 8° to 18°, not yet published.

TABLE B. TRIANGULATION FOR THE CONNECTION OF LONGITUDE STATIONS.

Geodetic Latitudes, Longitudes and Azimuths.

Longitude Station to be fixed	Name of Station		No. of Triangle	Latitude North ° ′ ″	Longitude East of Greenwich ° ′ ″	Azimuth		° ′ ″
MOOLTAN	Mooltan City Dome			30 13 4 77*	71 28 45 69*	Of Mooltan Fort Dome		302 43 49 1
	Mooltan Fort Dome			30 11 57 26*	71 30 46 58*	„ Mooltan City Dome		122 44 49 9
	Mooltan Telegraph Office	s	1	30 10 58 17	71 28 53 41	„ „ „		176 58 12 4
AMRITSAR	Rambagh	s		31 38 17 36†	74 55 14 23†	Of Amritsar Minaret	s.	2 25 57 4
	Amritsar Minaret	„		31 37 12 76†	74 55 11 02†	„ Rambagh	„	182 25 55 7
	Amritsar, Govindgarh Fort	„	2	31 37 36 55	74 54 9 50	„ „	„	233 36 26 1
	Amritsar Hall Gateway	„	3	31 37 53 17	74 54 57 77	„ Amritsar, Govindgarh Fort	„	68 5 0 8
	Amritsar, Ghagar Mal's House	„	4, 5	31 38 4 26	74 54 50 05	„ Amritsar Hall Gateway	„	329 12 52 5
	Amritsar Longitude	„	6	31 37 58 72	74 54 50 63			
PESHAWAR	Pir Sabak	h s		34 1 31 40‡	72 5 54 34‡	Of Jalala Sir	h.s.	36 46 30
	Jalala Sir	„		33 47 24 09‡	71 53 19 15‡	„ Pir Sabak	„	216 33 29
	Peshawar, Ghor Khatri	s	7	34 0 32 20	71 37 17 09	„ „	„	267 29 44 3
	Peshawar Telegraph Office	„	8	34 0 17 66	71 35 26 81	„ Peshawar, Ghor Khatri	s	260 59 47 1
NAGARKOIL	Radhapuram	S.		8 16 59 44§	77 44 34 89§	Of Manpottai	H.S	81 36 45
	Kudankulam Observatory	„		8 10 21 55§	77 43 53 44§	„ Radhapuram	S.	185 55 26
	Manpottai	H S		8 15 51 31§	77 37 5 16§	„ Kudankulam Observatory	„	309 11 42
	Thovalamalai	h s	9, 10	8 12 37 57	77 34 14 15	„ Manpottai	H S	221 1 45
	Tatakamalai	„	11	8 16 10 82	77 31 28 36	„ Thovalamalai	h s	322 14 29
	Amritwamalai	„	12	8 8 0 63	77 33 1 03	„ „	„	194 44 10
	Nagarkoil Longitude	s	13, 14	8 11 25 30	77 28 30 74			
QUETTA	Mashelak	h s		30 14 54 38‖	66 48 54 78‖	Of Takatu	h s.	248 2 35 24
	Takatu	„		30 19 7 85‖	67 0 59 68‖	„ Mashelak	„	68 8 40 79
	Quetta Telegraph Office	s	15	30 11 57 37	67 2 58 62	„ „	„	103 40 35 49
WALTAIR	Waltair	h.s		17 42 35 06¶	83 21 18 45¶	Of Waltair Heliotrope	s.	209 2 52
	Waltair Heliotrope	s		17 43 34 50¶	83 21 52 90¶	„ Waltair	h.s.	29 3 2
	Waltair, Narsing Rao's House		17	17 43 29 75	83 21 29 71	„ Waltair Heliotrope	s.	257 56 6
BOLARUM	Lachhmanpur	h s.		17 32 3 86**	78 25 37 05**	Of Hyderabad, Naubatpahar	h.s.	327 58 28 88
	Hyderabad, Naubatpahar	„		17 24 19 02**	78 30 39 87**	„ Lachhmanpur	„	147 59 59 79
	Bolarum P W.D Office	s	18	17 30 11 21	78 33 38 47	„ „	„	103 43 34 18

* Taken from the final computations of the Mooltan-Shujabad-Khangarh Secondary Series.
† *Vide* pages 88—$_{F}$ and 112—$_{F}$ of the Gurhagarh Meridional Series, Synoptical Volume IV
‡ „ page 94—$_{D}$ and final computations of the Great Indus Series, Synoptical Volume I.
§ „ pages 166—$_{A}$ and 167—$_{A}$ of the Great Arc Meridional Series, Section 8° to 18°, Volume XII of the *Account of the Operations, &c*
‖ Taken from the field computations of the Quetta Secondary Series, which are not in terms of the final reduction of the triangulation of the Great Trigonometrical Survey
¶ *Vide* page 65—$_{D}$ of the Bider Longitudinal Series, Synoptical Volume X.
** Taken from the final computations of the Great Arc Meridional Series, Section 8° to 18°, not yet published.

TABLE C DEDUCTION OF THE GEODETIC ELEMENTS OF THE LONGITUDE STATIONS.

Name of Station	Latitude North	Longitude East of Greenwich	Remarks
	° ′ ″	° ′ ″	
Agra Longitude s.	27 9 39 93	78 3 29 07	*Vide* page (19) of Vol: X of the *Account of the Operations, &c*
Mooltan Telegraph Office s.	30 10 58 17	71 28 53 41	Fixed by special triangulation (*vide Tables A* and *B*)
Reduction to Longitude s	+ 0 53	+ 1 16	A peg on the meridian of the Longitude s., and 40 78 feet north of it was observed to, and its distance from the Telegraph Office s found by direct measurement to be 138 37 feet, *vide* page (4)
Mooltan Longitude s.	30 10 58 70	71 28 54 57	
Deesa Longitude s	24 15 29 35	72 13 32 03	*Vide* page 258 of Vol: IX of the *Account, &c*
Amritsar Longitude s.	31 37 58 72	74 54 50 63	Fixed by special triangulation (*vide Tables A* and *B*)
Kurrachee Longitude s	24 51 2 44	67 3 20 40	*Vide* page 259 of Vol: IX
Peshawar Telegraph Office s	34 0 17 66	71 35 26 81	Fixed by special triangulation (*vide Tables A* and *B*)
Reduction to Longitude s.	− 0 15	+ 0 64	The Longitude s is 15 3 feet south and 54 feet east of the Telegraph Office s, *vide* page (5)
Peshawar Longitude s	34 0 17 51	71 35 27 45	
Dehra Dun Dome Observatory T S	30 19 29 13	78 5 42 12	*Vide* page 86*—A of Synoptical Vol: II
Reduction to Longitude s.	0 00	+ 7 18	The Longitude s is 628 8 feet due east of Dehra Dun Dome Observatory T.S, *vide* page (5)
Dehra Dun Longitude s	30 19 29 13	78 5 49 30	
Madras Longitude s	13 4 3 75	80 17 21 51	*Vide* page 258 of Vol: IX
Bangalore Longitude s	13 0 41 29	77 37 27 37	*Vide* page 258 of Vol IX.
Nagarkoil Longitude s	8 11 25 30	77 28 30 74	Fixed by special triangulation (*vide Tables A* and *B*)
Mangalore Longitude s	12 52 14 14	74 53 9 89	*Vide* page 258 of Vol: IX
Bellary Longitude s.	15 8 33 06	76 58 6 16	*Vide* page 258 of Vol: IX
Bombay, Colaba s.	18 53 48 94	72 51 15 73	*Vide* page 64—B of Synoptical Vol: XXVI
Reduction to Longitude s.	+ 0 55	+ 0 55	*Vide* page 258 of Vol: IX
Bombay Longitude s.	18 53 49 49	72 51 16 28	
Kalianpur H S	24 7 11 26	77 41 44 75	*Vide* pages 134 and 135 of Vol: II of the *Account of the Operations, &c.*
Reduction to Longitude s.	− 0·35	0 00	The Longitude s is 35 21 feet due south of Kalianpur H.S, *vide* page (7)
Kalianpur Longitude s.	24 7 10 91	77 41 44 75	
Jubbulpore Longitude s.	23 10 [illegible] 10	79 59 29 79	*Vide* page (19) of Vol: X.

TABLE C. DEDUCTION OF THE GEODETIC ELEMENTS OF THE LONGITUDE STATIONS—(*Continued*)

Name of Station	Latitude North	Longitude East of Greenwich	Remarks
	° ′ ″	° ′ ″	
Quetta Telegraph Office s.	30 11 57 37	67 2 38 62	
Reduction to Longitude s.	− 0 08	+ 0 25	The Longitude s is 8 08 feet south and 22 25 feet east of the Telegraph Office s., *vide* page (7)
Quetta Longitude s	30 11 57 29	67 2 38 87	
Calcutta Latitude s.	22 32 54 67	88 23 55 95	*Vide* page 90—B of Synoptical Vol XII.
Reduction to Longitude s	+ 0 32	+ 0 33	The Longitude s. is 32 75 feet north and 31 375 feet east of the Latitude s., *vide* page (8)
Calcutta Longitude s.	22 32 54 99	88 23 56 28	
Waltair, Narsing Rao's House	17 43 29 75	83 21 29 71	Fixed by special triangulation (*vide Tables A* and *B*)
Reduction to Longitude s.	− 0 44	+ 0 99	The Longitude s. is 44 25 feet south and 95 50 feet east of Narsing Rao's House, *vide* page (8)
Waltair Longitude s	17 43 29 31	83 21 30 70	
Bolarum P W.D Office s	17 30 11 21	78 33 38 47	Fixed by special triangulation (*vide Tables A* and *B*)
Reduction to Longitude s.	+ 2 20	− 0 17	The Longitude s. is 221 63 feet north and 16 394 feet west of P W.D Office s, *vide* page (8)
Bolarum Longitude s	17 30 13 41	78 33 38 30	
Fyzabad Longitude s	26 46 40 66	82 10 35 33	*Vide* page (19) of Vol: X

APPENDIX.

No. 2.

ON RETARDATION

The transmission of electrical signals along a telegraphic wire, though of enormous velocity, is not absolutely instantaneous, and hence it follows that the value of an arc of longitude will differ, according as it is determined by the transmission of clock signals from east to west, or from west to east, in other words, if the true value of the arc is ΔL, ρ the time of transmission in either direction (assumed to be equal in both cases), ΔL_E and ΔL_W the values of the arc as determined by the east and west clocks respectively, then

$$\Delta L = \tfrac{1}{2}\{\Delta L_E + \rho + \Delta L_W - \rho\} = \tfrac{1}{2}(\Delta L_E + \Delta L_W) \quad \text{and} \quad \rho = \tfrac{1}{2}(\Delta L_W - \Delta L_E)$$

Hence a value of ρ may be obtained from each arc measured, and an attempt is here made to deduce from these values a law for the velocity of the transmission of the signals

In the following list the arcs are given in order of their lengths The first column contains the date of measurement, the second, the names of the terminal stations Column 3 contains the distances as measured along the telegraph lines, column 5, the actual retardations as deduced from the formula $\rho = \tfrac{1}{2}(\Delta L_W - \Delta L_E)$ Column 4 will be explained below

List of Longitude Arcs, showing the Distances by Telegraph Route, and the Theoretical and Observed Retardation on each

Year of Measurement	Name of Arc	Distance in miles	Retardation in seconds of time by		Remarks
			Prussian Formula	Observation	
1875-76	Bangalore-Bellary	187	003	025	
1883-84	Akyab-Chittagong	195	003	036	
1887-88	Madras-Bangalore	216	003	054	
1875 76	Bolarum-Bellary	235	003	009	
1885 86	Amritsar-Moolten	240	004	027	
1885-86	Dehra Dun-Amritsar	275	004	056	
1885-86	Dehra Dun-Agra	280	004	042	
1883-84	Prome-Akyab	282	004	042	
1882-83	Fyzabad-Agra	285	004	053	*Viâ* Lucknow and Cawnpore

List of Longitude Arcs, showing Distances by Telegraph Route, and the Theoretical and Observed Retardation on each—(Continued)

Year of Measurement	Name of Arc	Distance in miles	Retardation in seconds of time by		Remarks
			Prussian Formula	Observation	
1889-90	Agra–Kalianpur	290	·005	·053	By special line made to Sironj now dismantled.
1889-90	Jubbulpore–Kalianpur	296	·005	·048	
1882-83	Jalpaiguri–Calcutta	305	·005	·045	
1875-76	Madras–Bellary	305	·005	·023	*Viâ* Madras Railway to Guntakal and thence to Bellary by Mysore State Railway
1885 86	Amritsar–Peshawar	310	·005	·047	
1882-83	Chittagong–Calcutta	351	·006	·061	*Viâ* Dacca.
1883-84	Moulmein–Prome	363	·006	·023	
1880-81	Bombay–Deesa	410	·007	·042	
1880-81	Deesa–Kurrachee	425	·007	·064	
1887-88	Bellary–Mangalore	425	·007	·061	
1885 86	Agra–Amritsar	435	·007	·018	*Viâ* Ghaziabad
1891 92	Waltair–Bolarum	444	·007	·107	
1882 83	Fyzabad–Jubbulpore	454	·008	·052	
1887 88	Madras–Mangalore	454	·008	·058	
1875 76	Madras–Bolarum	465	·008	·021	*Viâ* Bezvada.
1880-81	Agra–Deesa	475	·008	·051	
1887 88	Nagarkoil–Mangalore	475	·008	·042	
1880-81	Jubbulpore–Agra	476	·008	·070	
1883-84	Prome–Chittagong	477	·008	·048	
1885 86	Peshawar–Mooltan	486	·008	·067	
1891 92	Bolarum–Bombay	487	·008	·086	
1891-92	Waltair–Madras	490	·008	·104	
1887 88	Madras–Nagarkoil	493	·008	·058	*Viâ* East Coast
1875 76	Bellary–Bombay	519	·009	·032	
1891 92	Fyzabad–Dehra Dun	530	·009	·083	*Viâ* Meerut, Deoband and Roorkee
1882-83	Calcutta–Fyzabad	533	·009	·067	
1889-90	Mooltan–Quetta	535	·009	·049	
1883 84	Akyab–Calcutta	546	·009	·063	
1889 90	Kurrachee–Quetta	548	·009	·078	
1889-90	Kalianpur Bombay	607	·011	·086	By special line to Sironj now dismantled.
1885 86	Mooltan–Kurrachee	610	·011	·062	
1880-81	Jubbulpore–Bombay	628	·011	·091	
1883-84	Moulmein–Akyab	645	·012	·038	
1882 83	Chittagong–Julpaiguri	656	·012	·113	*Viâ* Dacca and Calcutta.
1885-86	Agra–Mooltan	675	·013	·070	*Viâ* Lahore.
1891 92	Calcutta–Waltair	690	·013	·113	
1887 88	Bangalore–Nagarkoil	710	·013	·075	*Viâ* Madras and East Coast
1882-83	Calcutta–Jubbulpore	736	·014	·083	*Viâ* Barhi and Allahabad
1882 83	Jalpaiguri–Fyzabad	838	·016	·124	*Viâ* Calcutta, Barhi and Benares.
1880-81	Bombay–Kurrachee	840	·016	·105	*Viâ* Deesa and Hyderabad.
1885-86	Deesa–Mooltan	840	·016	·052	
1889 90	Agra–Kurrachee	900	·018	·133	
1887-88	Mangalore–Bombay	945	·019	·093	
1880-81	Jubbulpore–Deesa	950	·019	·081	*Viâ* Allahabad and Agra.
1880-81	Jubbulpore–Bolarum	1115	·024	·119	*Viâ* Bombay
1891 92	Waltair–Jubbulpore	1176	·026	·191	*Viâ* Raniganj, Barhi and Allahabad.

There is little doubt that armature-time plays an important part in the retardations shown in column 5, and a term to represent it must be introduced in any formula employed for their investigation. It obviously does not depend on the length of the line, but on the adjustment of the chronograph-relays, the strength of the current, and other similar

causes; but as no record exists giving any details of these, it must necessarily be represented in the formula by a constant. In practice the relays were always so adjusted as to be easily moveable by a very weak current, with a view to reduce the armature-time as much as possible

The velocity of transmission of an electric signal along a wire is represented by Prussian geodesists by the formula

$$t = 000{,}012{,}9\, m + 000{,}000{,}008\, m^2$$

t is measured in seconds, and m is the length of the arc in miles, and column 4 in the above table contains the values of the retardations as computed thereby This formula is probably a purely empirical one, based on actual experiments, and is hardly likely to represent the true state of things, except for reasonably short distances of 1000 miles and under; for the presence of m^2 in the formula evidently presupposes a constant slackening in the speed of transmission as the distance increases, as may be easily shown from the following considerations:—

$$t = 000{,}012{,}9\, m + 000{,}000{,}008\, m^2 \text{ for the distance } m$$

$$\text{and } t' = 000{,}012{,}9\, (m+1) + 000{,}000{,}008\, (m+1)^2 \text{ for the distance } (m+1)$$

Hence the time of traversing 1 mile after having traversed m miles is

$$t' - t = 000{,}012{,}9 + 000{,}000{,}008 + 2m \times 000{,}000{,}008$$

and as m becomes very large the first two terms may be neglected and therefore

$$t' - t = m \times 000{,}000{,}016$$

Hence it is evident that as m increases $t' - t$ increases, or in other words the velocity decreases, a brief calculation on this basis will show that after traversing 62½ millions of miles, the velocity is reduced to one mile per second This however is obviously of little importance, if the formula represents the time of signal transmission within practical distances

In the following discussion it will be seen that a formula which includes only the first power of the distance represents the observed retardations very nearly as well as one which, like the Prussian formula, recognises also the square of the distance It will be more convenient if 100 miles instead of 1 mile be taken as the unit of measurement and the Prussian formula then becomes $t = 001{,}29\, l + 000{,}08\, l^2$, l being the distance thus expressed

Let us first trace out a formula which involves the square of the distance, and for this purpose assume that the time of signal-transmission may be represented by the formula

$$\rho = r + lx + l^2 y$$

where r is the relay or armature-time, and x and y are constants to be determined from the observations

Each arc in the above list furnishes an equation of this form, but to simplify the arithmetical solution they are collected into groups for each hundred miles of distance, thus for all distances from 150 miles to 250 miles the value of l is 2, for those from 250 to 350, l is 3, and so on, the equations then become

$r + 2x + 2^2y = 030$	being the mean of a group of	5	arcs
$r + 3x + 3^2y = 045$	„ „ „	9	„
$r + 4x + 4^2y = 055$	„ „ „	7	„
$r + 5x + 5^2y = 061$	„ „ „	17	„
$r + 6x + 6^2y = 069$	„ „ „	4	„
$r + 7x + 7^2y = 091$	„ „ „	5	„
$r + 8x + 8^2y = 094$	„ „ „	8	„
$r + 9x + 9^2y = 113$	„ „ „	2	„
$r + 10x + 10^2y = 081$	„ „ „	1	„
$r + 11x + 11^2y = 119$	„ „ „	1	„
$r + 12x + 12^2y = 191$	„ „ „	1	„

This group must now be solved on the principle that the values found for r, x, and y, when substituted in the equations produce residuals, the sum of whose squares is to be a minimum, each equation being weighted according to the number of arcs on which it is based.

The solution of these presents no difficulty; when treated by the well-known method applicable to such cases they give rise to the three following normal equations, *viz* —

$$55r + 284x + 1746y = 3{\cdot}607$$
$$284r + 1746x + 12488y = 21\ 782$$
$$1746r + 12488x + 101202y = 154\ 918$$

from which by the ordinary processes of elimination the following values are obtained

$$r = 023$$
$$x = 00537$$
$$y = 00047$$

giving as a formula for expressing the time of signal-transmission

$$^{*}\rho = 023 + 00537 \times l + 00047 \times l^2 \qquad (1)$$

Now if a formula be assumed based only on the first power of the distance we get, by omitting y, in the above schedule the two normal equations

$$55r + 284x = 3\ 607$$
$$284r + 1746x = 21\ 782$$

which give by elimination the following values

$$r = 007$$
$$x = 01129$$

these differ considerably from the former values, but they represent, by means of the equation

$$^{*}\rho = 007 + 01129 \times l \qquad (2)$$

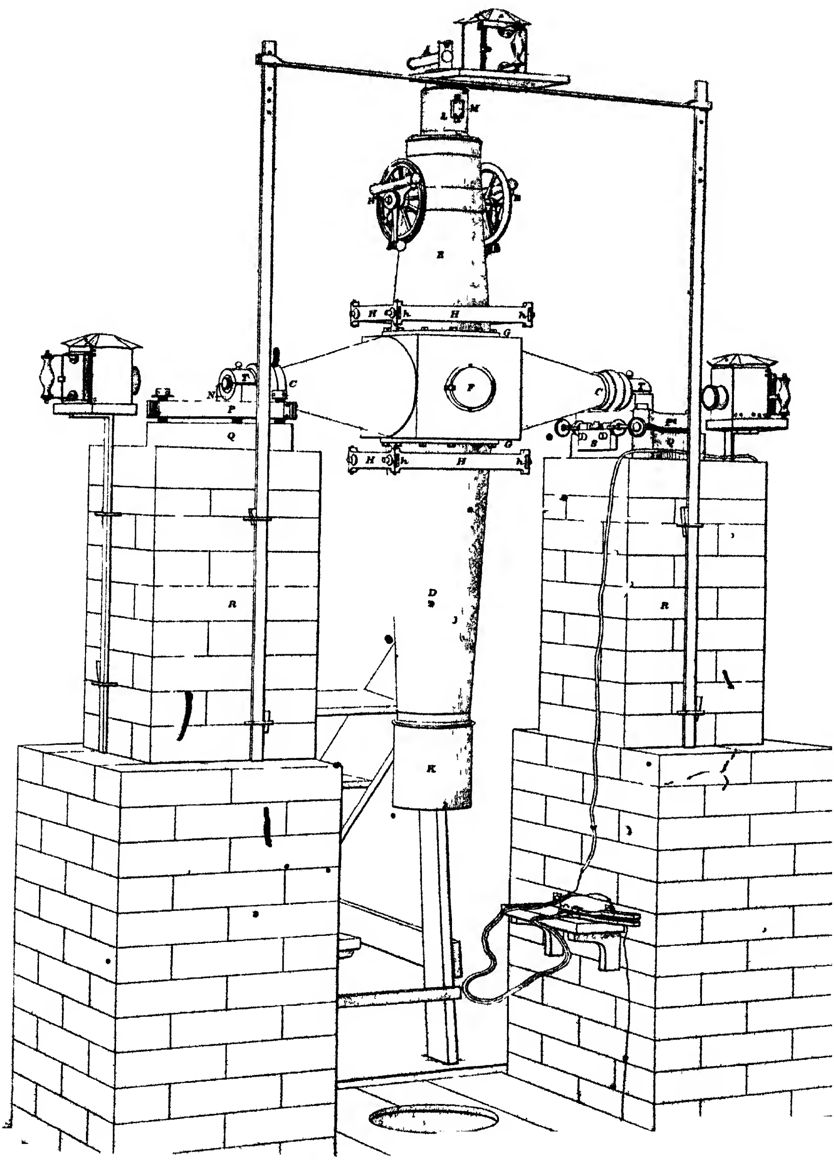
the actual values of retardation nearly if not quite as well The computed values of retardation as compared with the actual ones are as follows in the two systems —

By 1st formula	By 2nd formula	Actual
s	s	s
0 036	0 030	0 030
043	041	045
052	052	055
062	063	061
071	075	069
084	086	091
096	097	094
·109	109	113
124	120	081
139	131	119
155	142	191

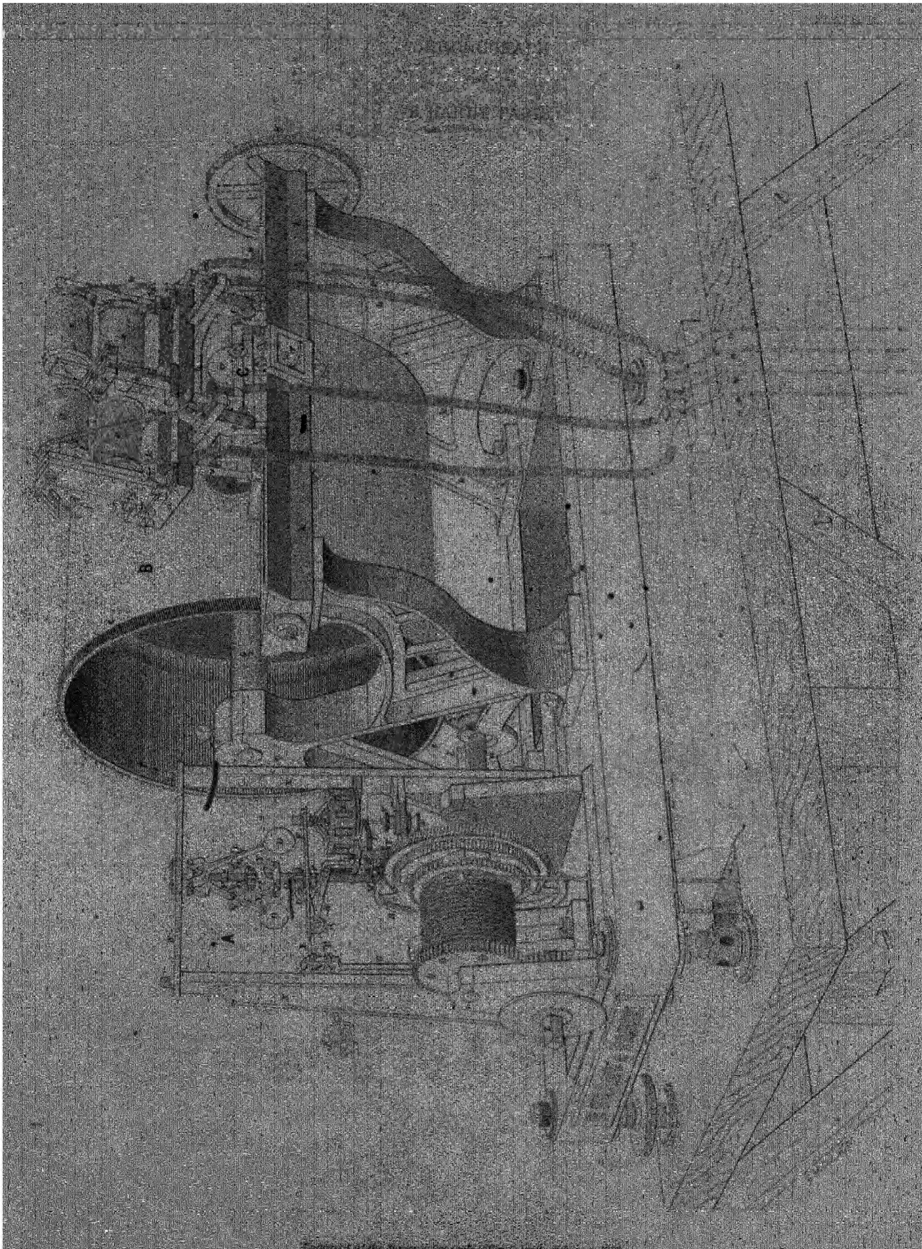
The last three arcs are very discordant in both systems, but this is partly accounted for by the last arc being the only one in the whole system, on which, owing to its great length, an intermediate relay was necessary, and partly by the actual values being based on one arc only The first formula gives for the rate of transmission of the signal about 4000 miles per second, and the second formula about 8800, that given by the Prussian formula being about 10,500 In the experimental arc measured at Dehra Dun where $l = 0{\cdot}1$ it was found that ρ or $r = 015$, it is probably only a chance coincidence that this is exactly the mean of the values of r given by the 1st and 2nd formulæ.

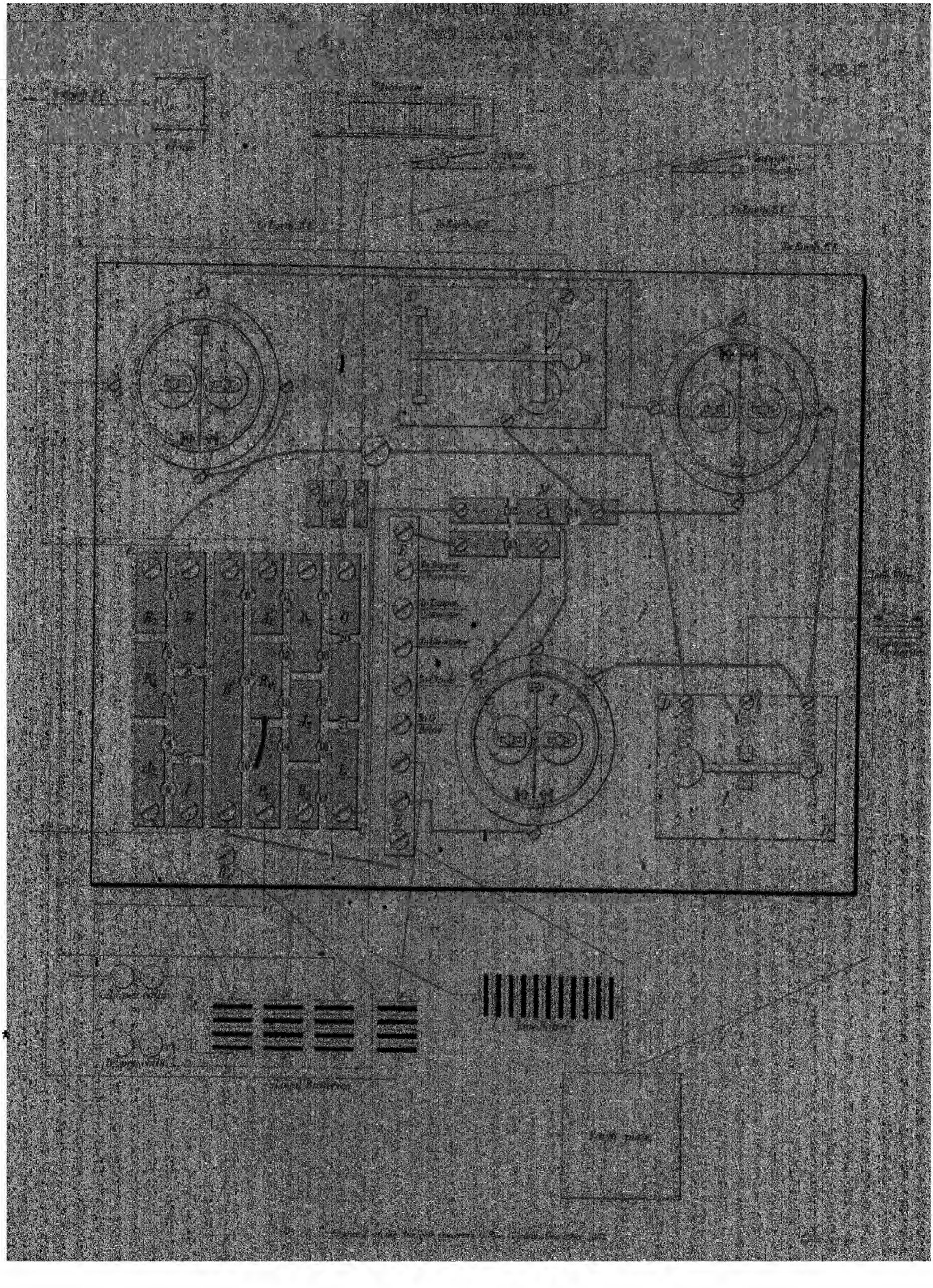
The observed values of retardation immensely exceed those given by the Prussian formula in every case, but as no details are at hand as to the thickness, insulation, or material of the wires, or the strength of battery employed in deducing it, no conclusion as to the reason of the discrepancy can be drawn

* In this formula 100 miles is the unit of the measurement l, and ρ is measured in seconds of time.

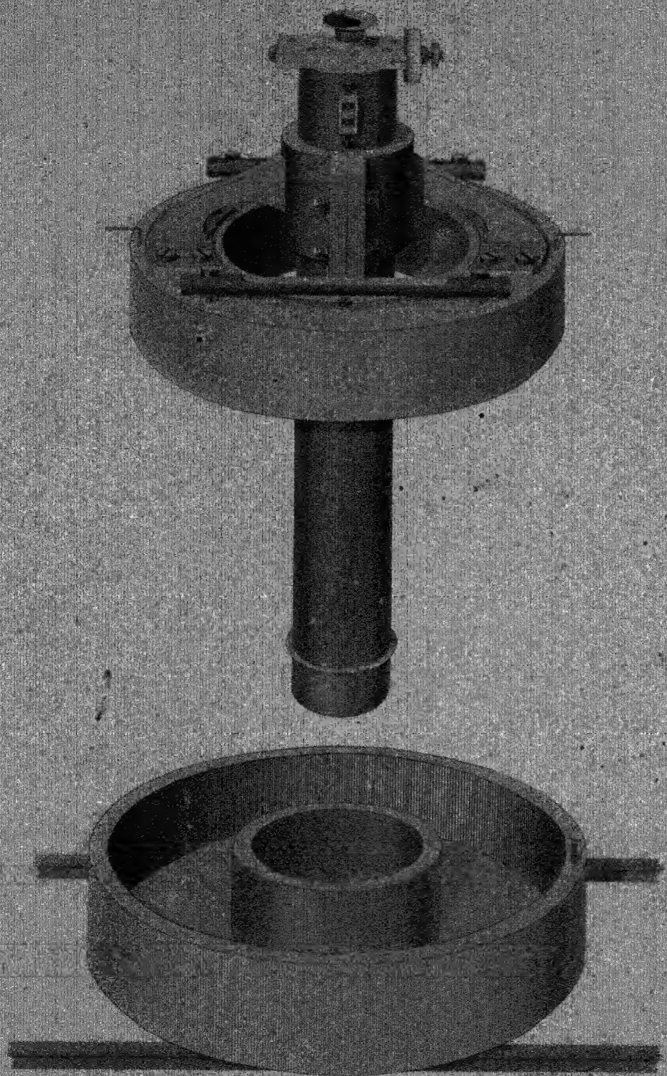


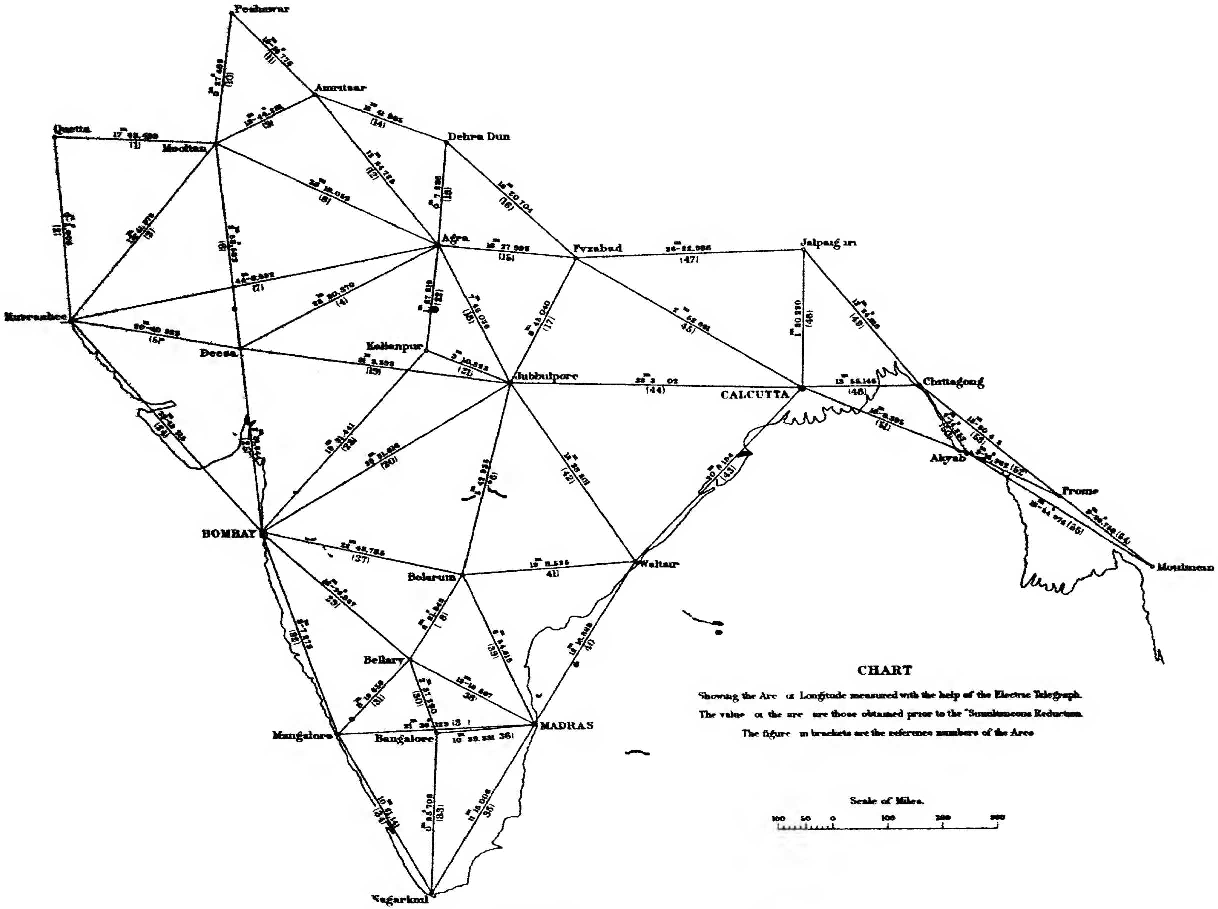
Engraved at the Surveyor General's Office, Calcutta, February 1861.




Local Batteries
Line Battery
Earth plate

VERTICAL COLLIMATOR.





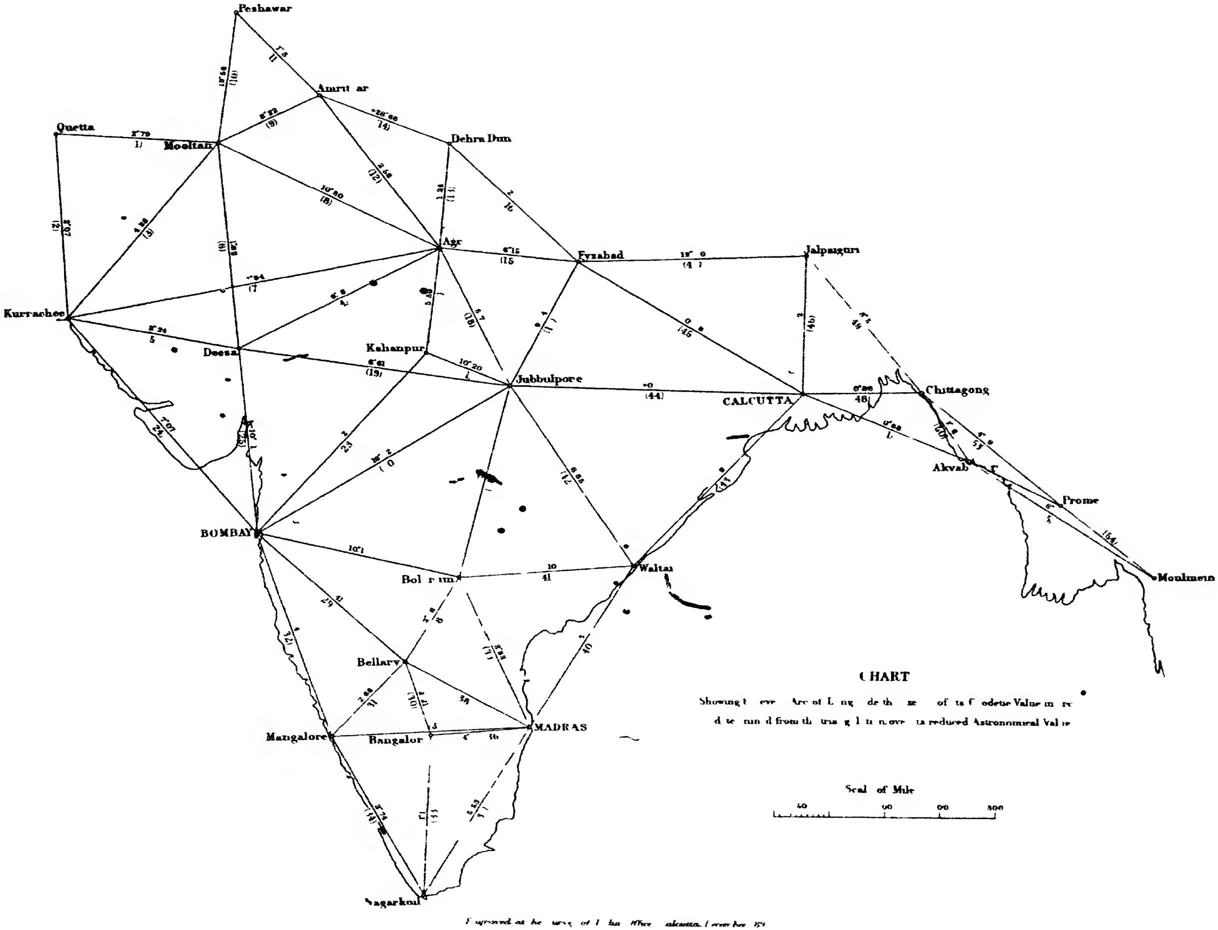
CHART

Showing the Arcs of Longitude measured with the help of the Electric Telegraph.

The values of the arcs are those obtained prior to the "Simultaneous Reduction."

The figures in brackets are the reference numbers of the Arcs

Engraved at the Survey of India Offices, Calcutta, December 189.



CHART

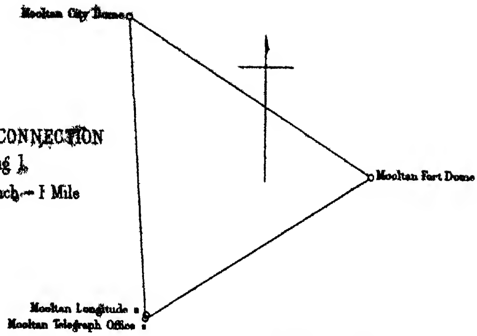
Showing t eve Arc of L ng de th se of ts C odetic Value in re d te mn d from th tria g l ti n ove ts reduced Astronomical Val ie

PLATE VII

MOOLTAN CONNECTION

Fig 1

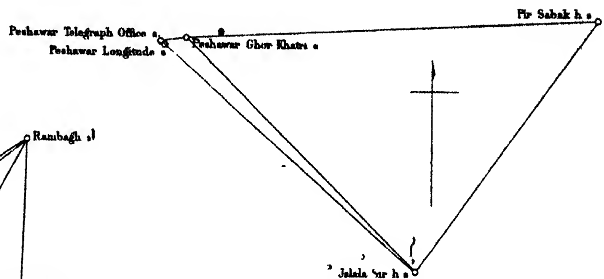
Scale 1 Inch = 1 Mile



PESHAWAR CONNECTION

Fig 3

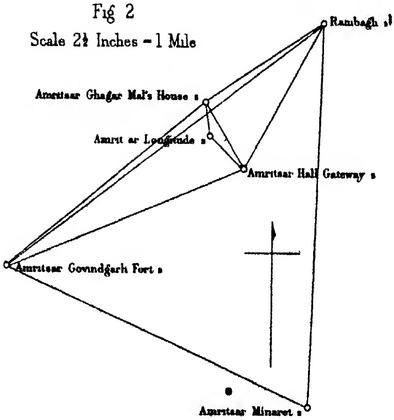
Scale 1 Inch = 8 Miles



AMRITSAR CONNECTION

Fig 2

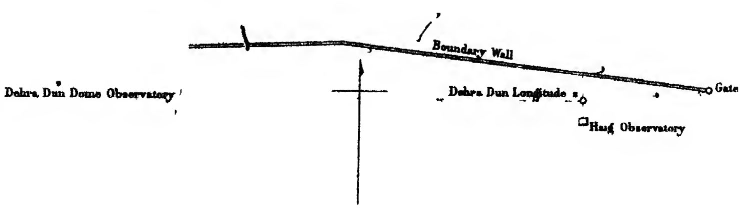
Scale 2½ Inches = 1 Mile



DEHRA DUN CONNECTION

Fig 4

Scale 200 Feet = 1 Inch



EXPLANATION OF SYMBOLS USED ON THIS PLATE

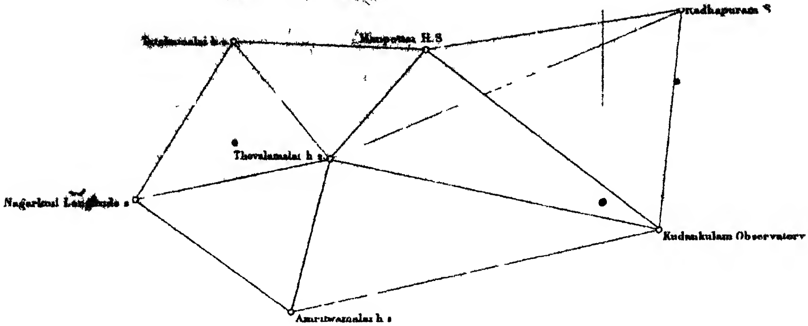
T.S signifies Tower Station (Principal)
h s. Hill Station (Secondary).
s Station (Secondary, in the plains)

Engraved at the Survey of India Offices, Calcutta, March 1893

NAGARKOIL CONNECTION.

Fig. 5

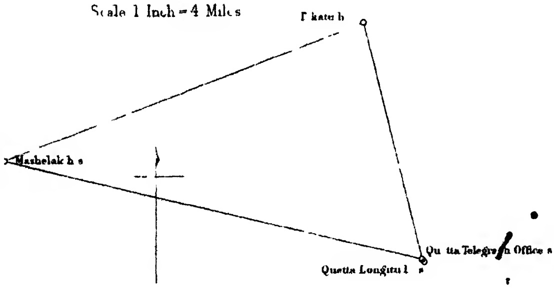
Scale 1 Inch = 4 Miles



QUETTA CONNECTION

Fig 6

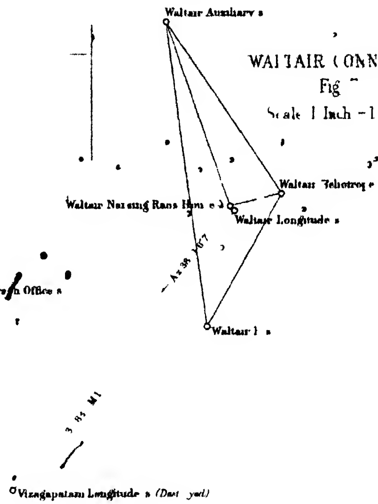
Scale 1 Inch = 4 Miles



WALTAIR CONNECTION

Fig 7

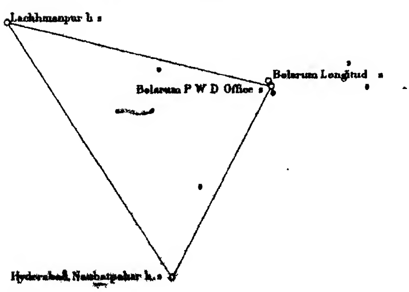
Scale 1 Inch = 1 Mile



BOLARUM CONNECTION

Fig 8

Scale 1 Inch = 4 Miles



EXPLANATION OF SYMBOLS USED ON THIS PLATE

H S signifies	Hill Station (Principal)
S	Station (Principal in the plains)
h.	Hill Station (Secondary)
s	Station (Secondary in the plains)

Engraved at the Survey of India Offices Calcutta February 1893

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